No. 284 / OCTOBER 1996

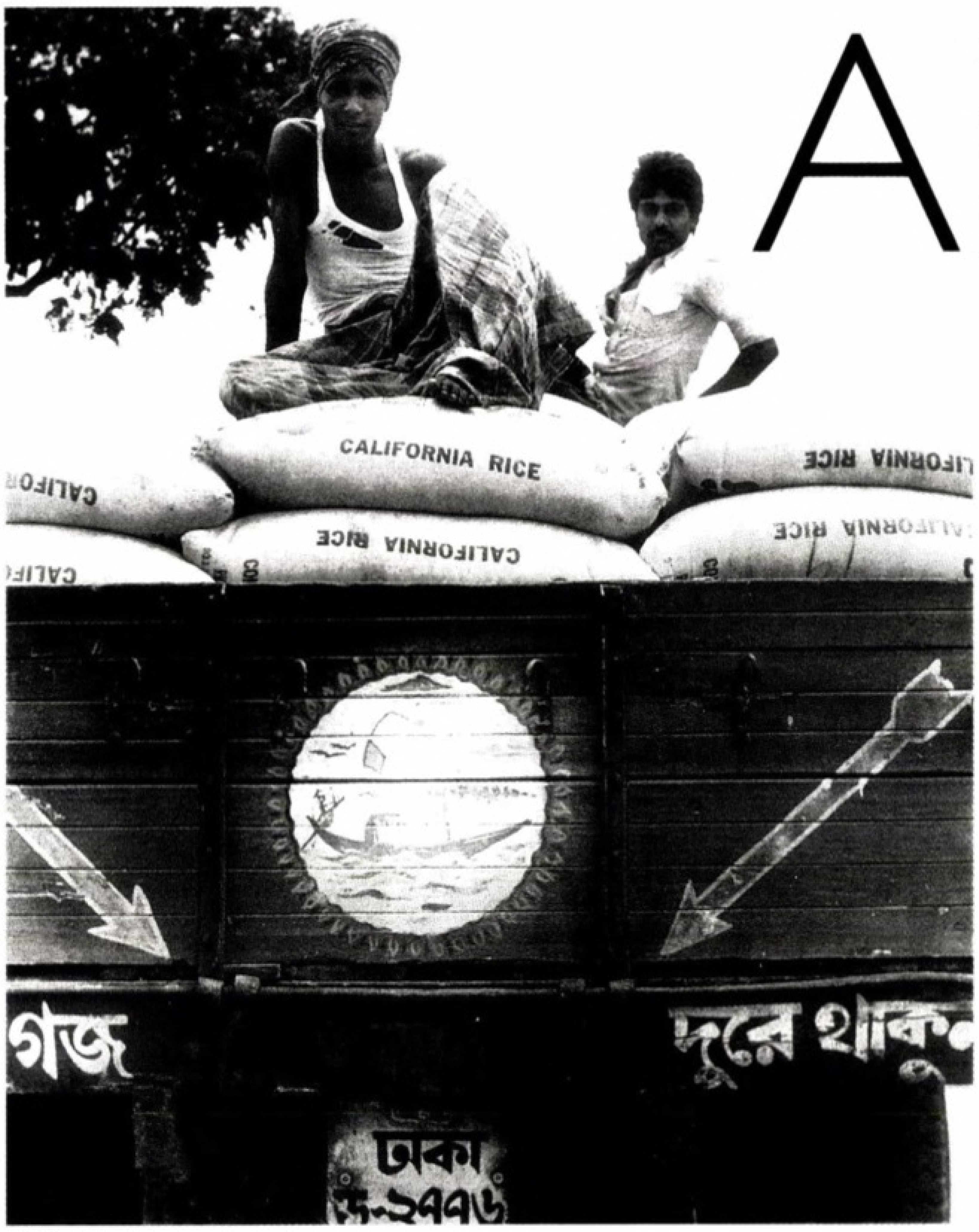
THE NI NEW INTERNATIONALIST

Sun, wind, water, earth, air...

The energy revolution

PRICE: UK £2.20 AUS. $5.60 AOTEAROA/NZ $4.50 CANADA/US $4.50 SA R9.50 ◆ THE PEOPLE, THE IDEAS, THE ACTION IN THE FIGHT FOR WORLD DEVELOPMENT

COMING NEXT MONTH



HANS SPRUYT

Aid

THIS YEAR, 1996, IS THE INTERNATIONAL YEAR FOR THE ERADICATION OF POVERTY and 17 October is the official UN Day set aside to mark it. At the same time, foreign-aid budgets are being slashed and aid agencies around the world are finding it harder than ever to raise funds. Such small amounts of foreign aid actually reach poor people (on average about $8 each every year), and such large amounts are misused, that doubts are being cast on the future of the whole operation. The NI takes a hard look at an 'industry' in crisis.

- Republic of the landless: how some of the poorest people in Brazil have taken matters into their own hands, with a little help from their friends
- Soap operation: why a corporal in the Canadian Army found himself handing out soap to children and taking food from their mouths on a rubbish dump in Rwanda
- Mea culpa run riot: the humanitarian impulse rules OK
- The Mexican way: when a country that's supposed not to need it gets vast amounts of aid by another name
- Boy, that went wrong: but what went right? Looking back in anger from America
- The physician's condition: a prescription from the patient
- Lollipops: a cautionary tale based on real events in France
- Open to question: a round-up of inside opinion

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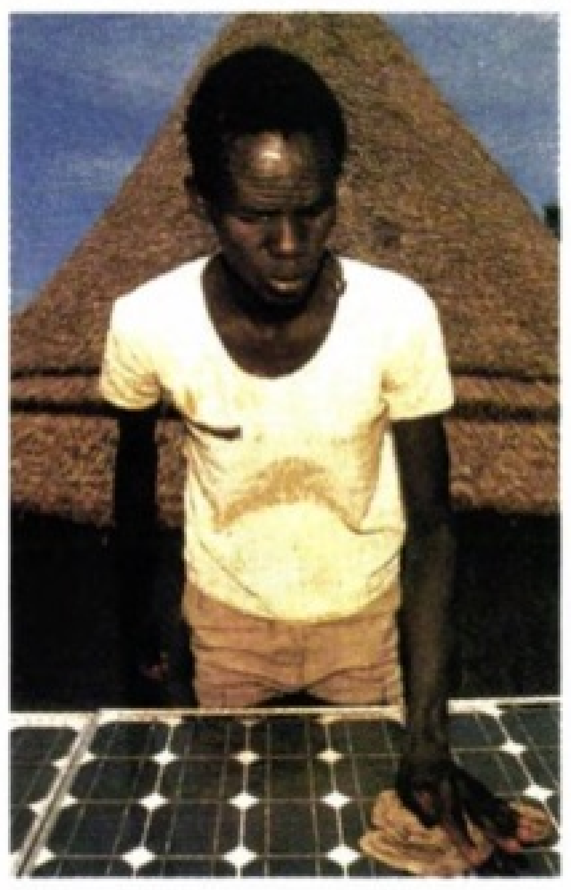

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THIS MONTH'S **THEME**

Energy

FROM THIS MONTH'S **EDITOR**

'MY GOD, what's happening to you? I do believe you are being seduced by science!'

I found, still find, it hard to believe. But something unusual was happening. And the tell-tale sign was there: a buzz of excited optimism as I related to my patient colleagues inspiring facts about the *awesome* energy potential of the sun, wind and tides.

My enthusiasm wasn't there in the beginning as I ploughed my way through piles of books and papers on 'energy'. ('Such a deadly word,' remarked a friend and I instantly knew what he meant, pictures of pylons and faceless men in hard hats flashing through my mind.)

Then came the startling realization that if you had to blame one thing for the most serious threat to life on earth today it would be: energy. Global warming, acid rain, air pollution, radioactive waste. You name it. They all result from the ways in which we, in the twentieth century, have chosen to generate and use our energy.

Hard on the heels of this insight came another, actually far more significant, one. *It does not have to be this way.* Not at all. We can change it. The science, the technological know-how is there. It's just that for the past 100 years or so we have chosen a certain energy path; one that relies heavily on fossil fuels and more recently nuclear fission instead of using the sun, wind, air, water or other 'renewable' sources. We could have done it differently. We just didn't.

We can do so still. Whether we will is another – a political – matter. The more people I talked to during the course of my research the more I came to realize that alternative energy is actually one of the most hopeful areas to work in and write about today. Seduced by science? Maybe. But if one is going to be seduced by science it may as well be the natural, holistic and life-affirming type rather than the divisive, invasive, life-denying one.

Perhaps I make change sound easy, which of course it isn't. And it's not just conservative attitudes and vested interests holding us back. It's also that we are not operating on a level playing-field. If we are talking about changing the world's energy systems we have to realize that the industrial North is glutted with energy, using seven times as much per capita as the South consumes. The South is starved of the cheap energy it desperately needs to fuel economic growth and haul itself out of poverty. So Northern and Southern priorities are likely to be quite different.

To explore this tension I have used a fictional device and created two characters, Gloria Thembisa from South Africa and Claire Green from England. This magazine follows them in their exploration of various energy paths. The device is fictive but the substance of the magazine is factual, with contributions from other writers interspersed with the narrative. Special thanks go to Sara Chamberlain for help with this research.

And now it's time to unfasten your mind-belts. The journey is about to begin.

Vanessa Baird

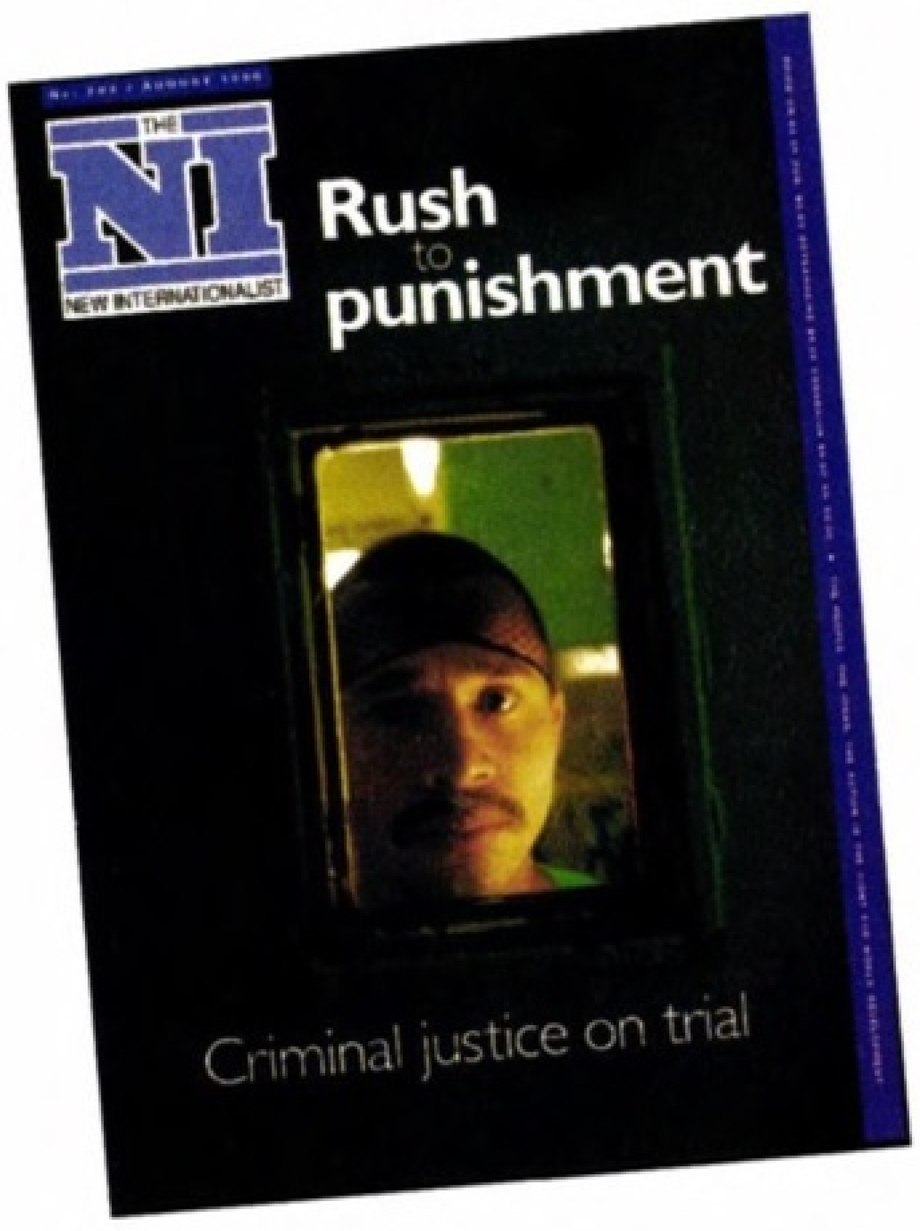
Vanessa Baird
*for the **New Internationalist** Co-operative*

Letters

The New Internationalist welcomes your letters. But please keep them short. They may be edited for purposes of space or clarity. Include a home telephone number if possible and send your letters to the nearest editorial office. The address and e-mail are inside the front cover.

Daily violence

I am writing to register my disgust at the association inferred in the interview with Nils Christie ***(Criminal Justice* NI 282)** between violence against women and people who have done 'something silly'. To minimize violence by reducing it to an issue of 'silliness', resolved by making 'good' the damage, is preposterous. It is crucial that we acknowledge the seriousness as well as the consequences of the violence we tolerate in our daily lives. Juxtaposing violence against women and a seriously flawed criminal-justice system is politically misguided and damaging. Violence in the home, where most violence against women occurs, is a microcosm of our violent society. Because of this, developing our understanding holds the key to developing a kinder world. Your interview contributed nothing to this development.



Jan Wagstaff
Nottingham, England

Utterly wrong

I enjoy the writings of Richard Dawkins (*Reviews* **NI 282**) and was interested to see that your review of *River out of Eden* reflected his own bigoted attitude towards other views. His statements of 'Wrong, utterly wrong' and 'the fallacy is utterly glaring' are not good examples of a reasoned defence against other views. I have spent over 20 years in scientific research and have learned to respect and consider other viewpoints. I am now nearing the end of a degree in theology which is showing me why things work. Perhaps Richard Dawkins would care to devote his next book to explaining why things work, rather than his usual how things (may) work.

Nicholas W King
Glasgow, Scotland

Confused class

The title ***Class – Out of the Shadows* (NI 281)** was great; unfortunately the contents continued the **NI** approach of presenting lots of good statistics with poor analysis.

NI continues capitalism's attack on class consciousness by promoting a confused concept of class which cannot but maintain the division of the working class into competing groups. The capitalist class consists of those whose income is derived from ownership of the means of production, who needn't work to live. The working class is the rest of us. That includes upwards of 90 per cent of the population of every country on this planet. By promoting the 'middle-class' versus 'working-class myth, **NI** damages working-class solidarity.

The cause of the problems in the world, or the reason they cannot be solved, is capitalism, and working-class solidarity to end capitalism is the solution.

Steve Szalai
Victoria, BC, Canada

ICTUR

In the *Action* section of the issue on ***Class* (NI 281)**, you state that the International Centre for Trade Union Rights (ICTUR) is based in Brussels. In fact, our address is UCATT House, 177 Abbeville Road, London SW4 9RL. Tel: (0)171 498 4700. Fax: (0)171 498 0611.

Tom Sibley,
ICTUR, London, England

Going back

The *Endpiece* story 'The Ark' **(NI 281)** moved me immensely. I too have suffered that guilty tension between a genuine belief in and passion for true equality and the real-life inadequacy and trauma of not being able to cope with some extremes of mental disability.

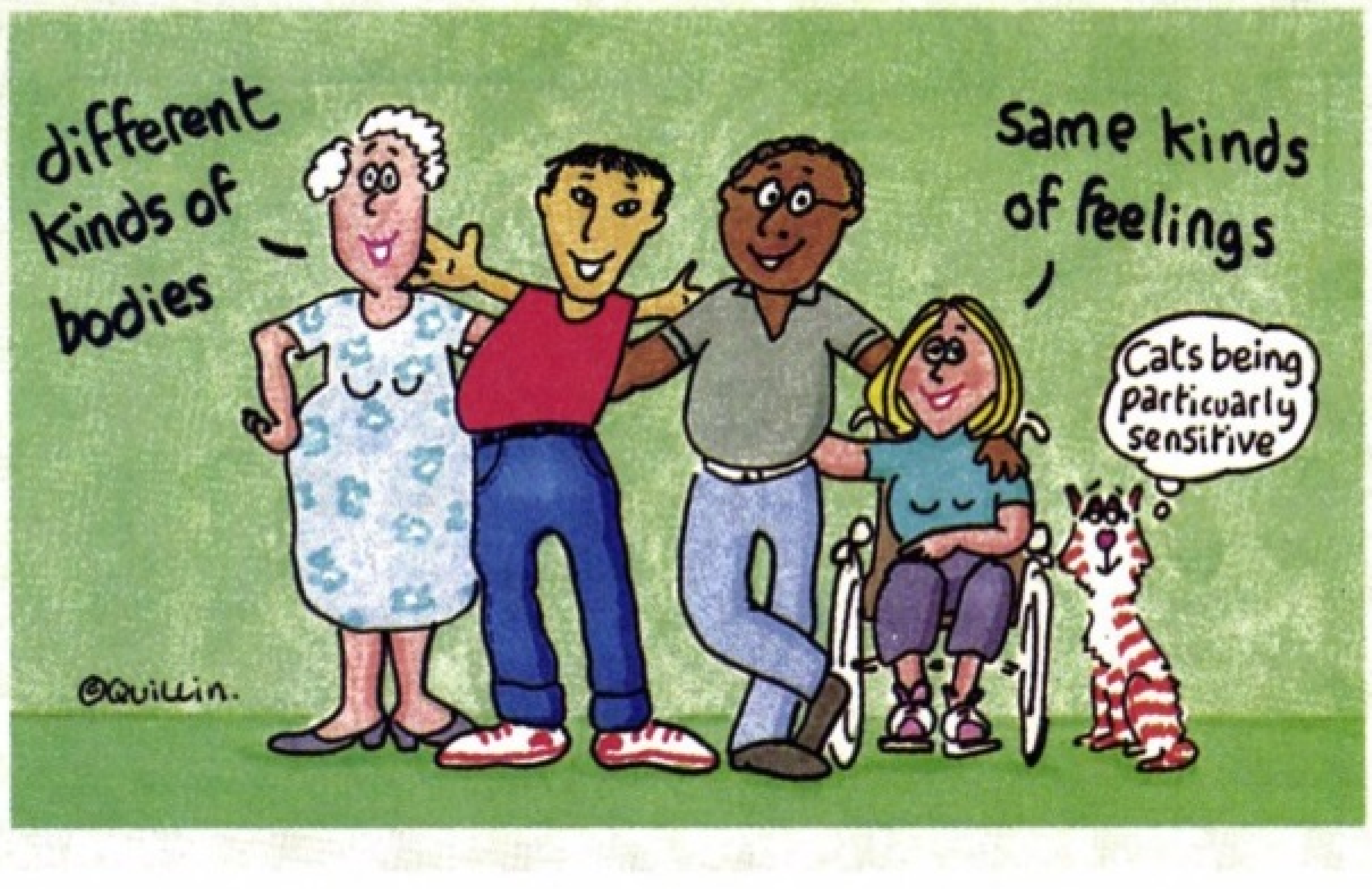
I admire Rod Isaacs greatly in being able to go back and can only pray that he, and I too one day, will be given the ability to enter into true solidarity with the people of L'Arche.

Felicity Windsor
Liverpool, England

Birth defects

In your *Update* **(NI 279)** you used a photograph to illustrate a piece on Vietnam about the effects of Agent Orange. The use of such a photo when discussing 'birth defects' seems extremely exploitative. It demeans and diminishes all of us, especially those born with a disability. I would also like to draw your attention to the use of the words 'birth defects'. Individuals who are born with a disability do not need to be labelled 'defective'.

Tony Sano
Dundas, Ontario, Canada



VIV QUILLIN

Mugabe's stand

After reading your *Update* **(NI 281)** on gays in Zimbabwe I began to see the light in the current thinking in many African intellectual circles that we can't just continue to be the trash-cans of other cultures' effluent. We must consume your cars, radios, microwaves, clothes, music, films, ideas, when the only things you will accept from us are 'primitive curios'.

We have seen a lot of this irrelevant Western trash crash resoundingly in Africa because it is imported wholesale and forced onto the people without regard to time and place. The West hates Mugabe because he can stand up to them, speak their language – and tell them to go to hell. Mugabe is no saint, but Zimbabweans have come to appreciate his guts when he tells the IMF, the World Bank and other Western dictators to get stuffed.

Donatus Bonde
Gweru, Zimbabwe

People, Ideas, Action

One question I've had for a long time concerns your subtitle: 'The People, the Ideas, the Action in the Fight for World Development'. For instance, is 'world development' really a goal of ***Green Economics* (NI 278)**? Also, being a pacifist, I've had a bit of a problem with your use of the word 'fight'. I prefer 'struggle', as it has a better chance of referring to a non-violent process.

Doris Giese
New York, US

International Health Conference

The International People's Health Council, the National Progressive Primary Health Care Network of South Africa, and the South Africa Health and Social Services Organization are planning a conference on 'The New World Order – A Challenge to Health for All by the Year 2000'. The conference will be held in Cape Town on 29-31 January 1997. We are keen to encourage the participation of a broad range of primary healthcare workers, especially those who can tell stories of work that happens locally but which challenges the global threats to health. We are calling these 'Stories for Change' and guidelines on putting them together are available from us.

Interested parties should contact the International Conference Organizing Committee, Stories of Change, SAHHSO, PO Box 43241, Salt River 7924, Cape Town, South Africa.

María Hamlin Zúniga
IPHC Global Co-ordinator,
Managua, Nicaragua

Larium sufferers

I write to draw attention to the controversial anti-malaria drug Larium – also known as Mefloquine. On leaving to work in Angola, I was aware that the risk of neuro-psychiatric side effects from Larium was, according to Hoffman La Roche, 1:10,000. I was also aware that anyone with a pre-existing cardiac conduction problem should not take the drug.

Since having stopped taking the drug six months ago, I have experienced a cardiac conduction disorder, severe dizziness and mood swings. I am just one of hundreds of 'Larium sufferers' whose normal working and social lives have been totally disrupted. There is no antidote and individual recovery rates and detoxification are anything from three months to two years.

There are currently 500 people suing La Roche. I hope that my letter probes people to think very carefully about taking a 'safe' malaria prophylactic. For further information contact Larium Action, 122 Balgores Lane, Gidea Park, Romford, Essex RM2 5SX, England.

Sarah Chave
Dymock, England

The views expressed on the letters page are not necessarily those of the New Internationalist.

LETTER FROM **CHECHNYA**

Dust and memories

Olivia Ward remembers two lovers – who were also combatants in the bloody war between Chechnya and Russia.

I MET ROSA in a friend's house in a village that is now dust and memories. 'I started as a farm girl,' she said with a smile. 'Then I became a nurse. And then...' She kept her voice low. In a war zone you cannot be too careful.

Rosa was a fighter, one of the many who had taken up the gun against Russia when their homes were destroyed or family members killed.

With her creamy skin, soft grey eyes and red hair she looked more like the milkmaid she had once been. And, she admitted, in the beginning the hardest part was dressing for the job.

'I used to wear a skirt, because I am a devout Muslim. But my commander said I was crazy, this was war.'

She blushed.

'I put on fatigues, just like the men. But at first I wore the skirt over them.'

As we rode into the hills the next day to the dull thud of Russian rockets, Rosa's shyness abated a little. She was married, she told me. But her husband had left Chechnya to earn money in Azerbaijan. In the year he had been gone there was no word, and no money.

I wanted to ask if, as the only woman in a group of 30 men, she had formed any new attachments. But for a strict Muslim woman the question was not merely shocking but insulting.

'Relationships are very different up here,' she volunteered. 'Instead of living completely separate lives from men as we normally do, here we are all comrades. In war some traditions can't be observed.'

Her eyes glowed with excitement as she explained how she now ate all her meals alongside men, talked to them as equals, and sometimes gave them orders.

As our springless four-wheeler heaved over the steep track, she jumped out and ran to the top of the hill, oblivious to the rocket bursts.

At dusk I sat on the ground with some resting fighters, sipping tea. Rosa had disappeared from view.

Worried, I moved cautiously around the shadow of the trees as fresh blasts reverberated. In front of me was the outline of two people in rapt conversation. They sat side-by-side, but only their fingers were touching.

Rosa's eyes met mine in the flickering dimness. She smiled.

The next day as we sat in the jeep she said simply, 'His name is Issa.'

Their forbidden relationship began six months earlier, when he helped her collect the wounded in Grozny. Then he joined her unit and they were together almost every day.

'I had no idea of what men thought or felt,' she admitted wonderingly. 'Even my husband. In our society men make demands and women fulfil them. It is part of our religion and sense of duty.'

Issa told her his thoughts and feelings. He was eager to understand hers. As the death-dealing weeks passed, a new kind of love took root. Not a physical one, as taboos were too strong and they were never alone. But a bond that made even their daily hell bearable.

'When we die, we go straight to paradise,' Rosa whispered. 'We will meet each other there. It is all we can expect.'

That was one year ago. Since then death has travelled to every corner of the land, feasting on civilians and combatants alike.

Rosa vanished defending a village where her refugee relatives were hiding from Russian bombs. Issa fell in a rocket attack on an ammunition dump.

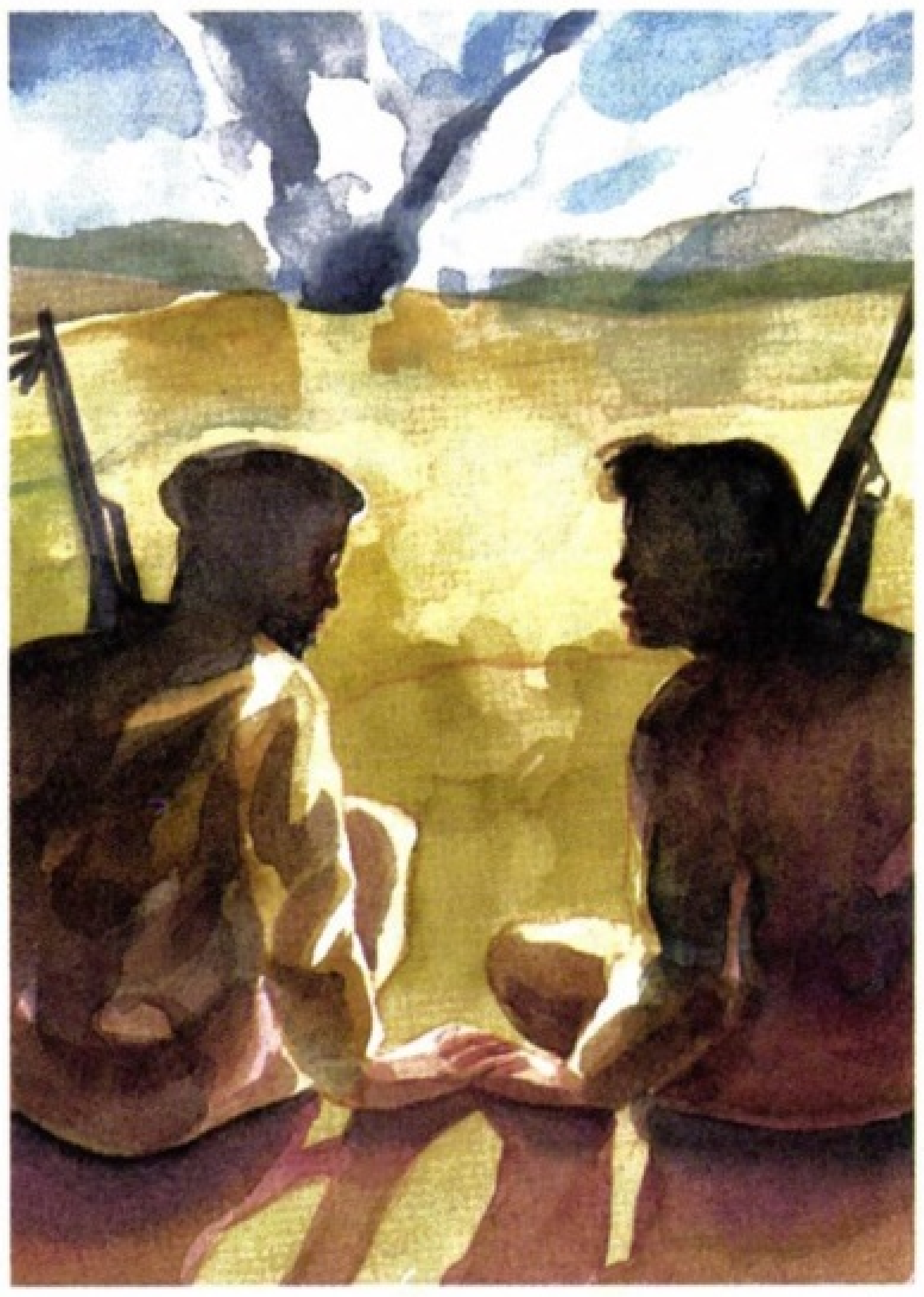


ILLUSTRATION: SARAH JOHN

Now I stood at the edge of a mass grave in Grozny, staring at anonymous mounds of earth, washed over with grief.

I remembered how Rosa and her friends had prayed that night on the hill, prayers for the safety of all of us. As an unbeliever I had only wishes.

Now, looking at the pathetic heaps of earth with their final indignity of fading number tags, I wished from the bottom of my heart that I had the faith to pray for them, even too late.

I knelt in the dry, bitter wind and crushed a bit of earth between my fingers. Was she there, somewhere? And Issa? Lives blocked, cut off, done violence, ground to dirt.

At Jean-Paul Sartre's grave, Simone de Beauvoir had said: 'His death separates us. My death will not unite us.'

But my fingers pressed the earth as though Rosa and Issa were, somehow, brought together there in the palm of my hand.

Thinking, may there be paradise.

May you find it. ■

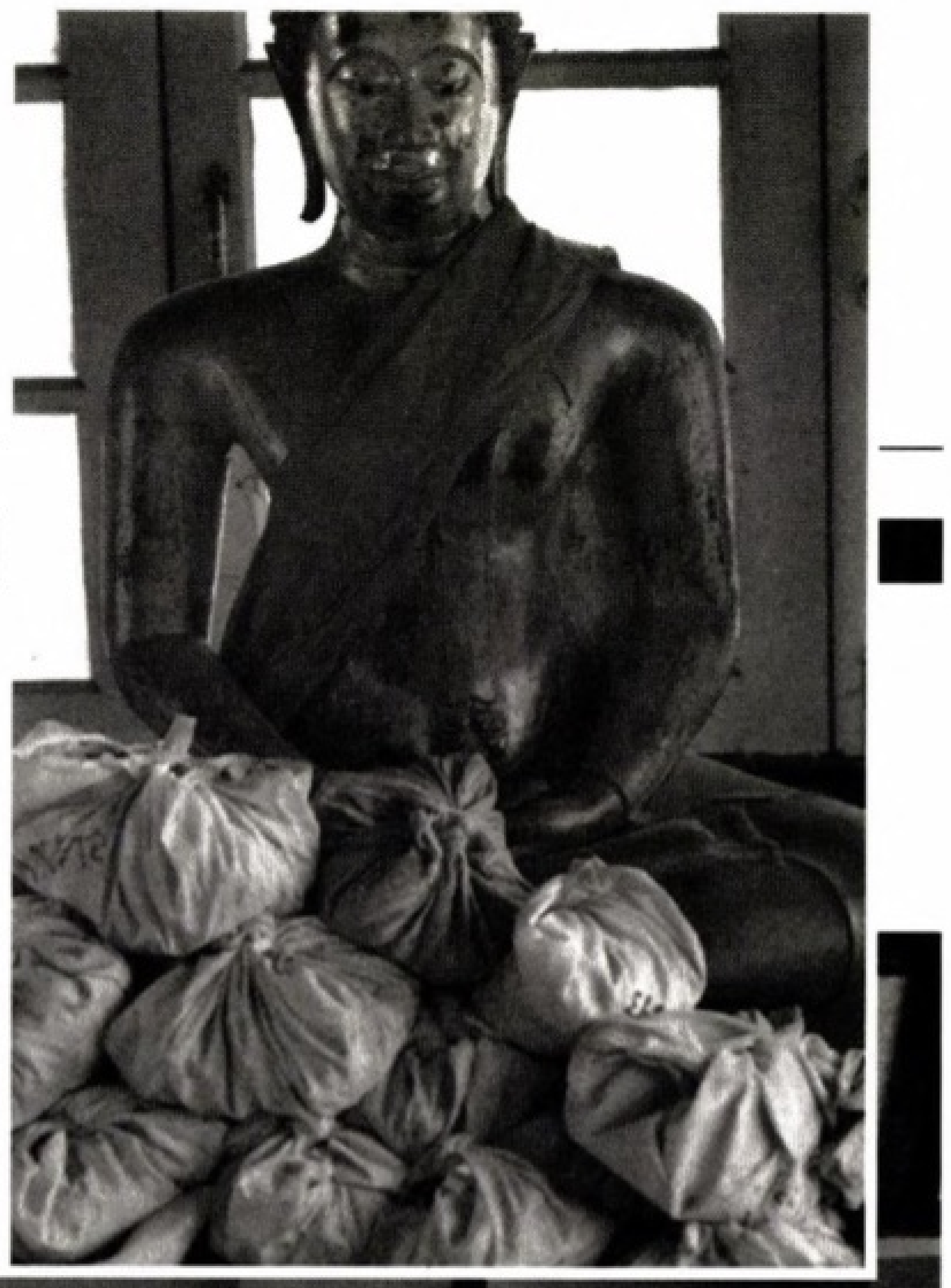
Olivia Ward is bureau chief for the *Toronto Star.*

Update

THAILAND

At the foot of Buddha

Monks at the forefront in caring for AIDS patients



FRAZER DRYDEN

Frazer Dryden writes: Wat Phrabat Nampo monastery is Thailand's largest AIDS hospice, with 150 patients and more than 2,000 waiting to get in. Bags of bones and ashes lie beneath a statue of Buddha: some are never collected for fear of infection (top right). Kong Sak was a transvestite before joining the monastery: he is HIV positive (main picture, top). Surasak Koonpong, aged 19 and HIV positive, lifts a monk to his bed (left). Dariwan Wongpradit sits with her 18-month-old son, Whisut: both of them contracted HIV from his father.

THE GAMBIA

Sons of the soil

Forced farming brings in harvest

FARMING FEVER has hit the Gambia, as military ruler Captain Yahya Jammeh pursues his ambition to make the small West African country self-sufficient in food. In the beginning, Jammeh used public rallies to urge young men to return to agriculture, castigating them for neglecting the land and travelling to the coastal tourist areas, to Europe or the US, leaving their aged parents to farm up-river alone.

When his appeals to his country's young men to take an interest in hoeing and sowing fell on barren ground, Jammeh got tough. In June, bureaucrats were instructed not to issue any young men with a passport until September, when the farming season ends and even then they would have to prove they had farmed in order to get one.

Women have always been farmers and gardeners, producing more than 80 per cent of the nation's crops, but the uncompromising message to young men has sparked a national fervour for farming. Virtually all available spaces – open patches of bushland, swamps, little strips of land beside housing compounds, hotels and garages – have been cleared, turned and planted.

Libya has donated tractors, power tillers and other equipment to help the Gambian food drive. The machinery is being distributed with a warning that it will be withdrawn from communities that fall short of production expectations. A German equipment manufacturer has run workshops in conjunction with the Women's Bureau on the use of milling machines to encourage people to grind their own flour and cereal. In Kartong, in the south, 35 dikes are being built by the community to help prevent salt intrusion into the rice fields.

'The present trend of demographic growth and rapid migration of the youthful population to urban areas has affected agricultural productivity,' says agricultural specialist Abdou Karim Sanneh. Currently subsistence farming has no appeal, Sanneh points out. Power and prestige are what will count if the young are to be encouraged to farm as a career.

Right now, though, whether from fear of soldiers, fear of hunger or a genuine enthusiasm to see things grow, almost every young man has become a son of the soil. ■

Rosemary Long / Gemini

Puffin power

Greenpeace are campaigning to save the North Sea, where highly unsustainable and unregulated industrial fishing activities have brought the cod population to a third of its minimum safe size. One of the problems is the capture of sand eels – which form food for hundreds of species – along with the rest of the catch. Currently the eels are turned into animal feed and oils for biscuits, cakes and margarine. In May Greenpeace activists dressed as puffins, blocked the entrance to McVities – Britain's leading biscuit manufacturer – in West London to protest the company's use of fish oil. Within hours McVities agreed 'to cease the use of fish oil from non-sustainable industrial fishing in European waters within one year'. Other corporations and supermarkets have also made similar assurances.

McVITIES - TAKE THE FISH OUT OF YOUR BISCUITS
McFISHIE'S
Fish Tea
GREENPEACE

GREENPEACE / HOFFMAN

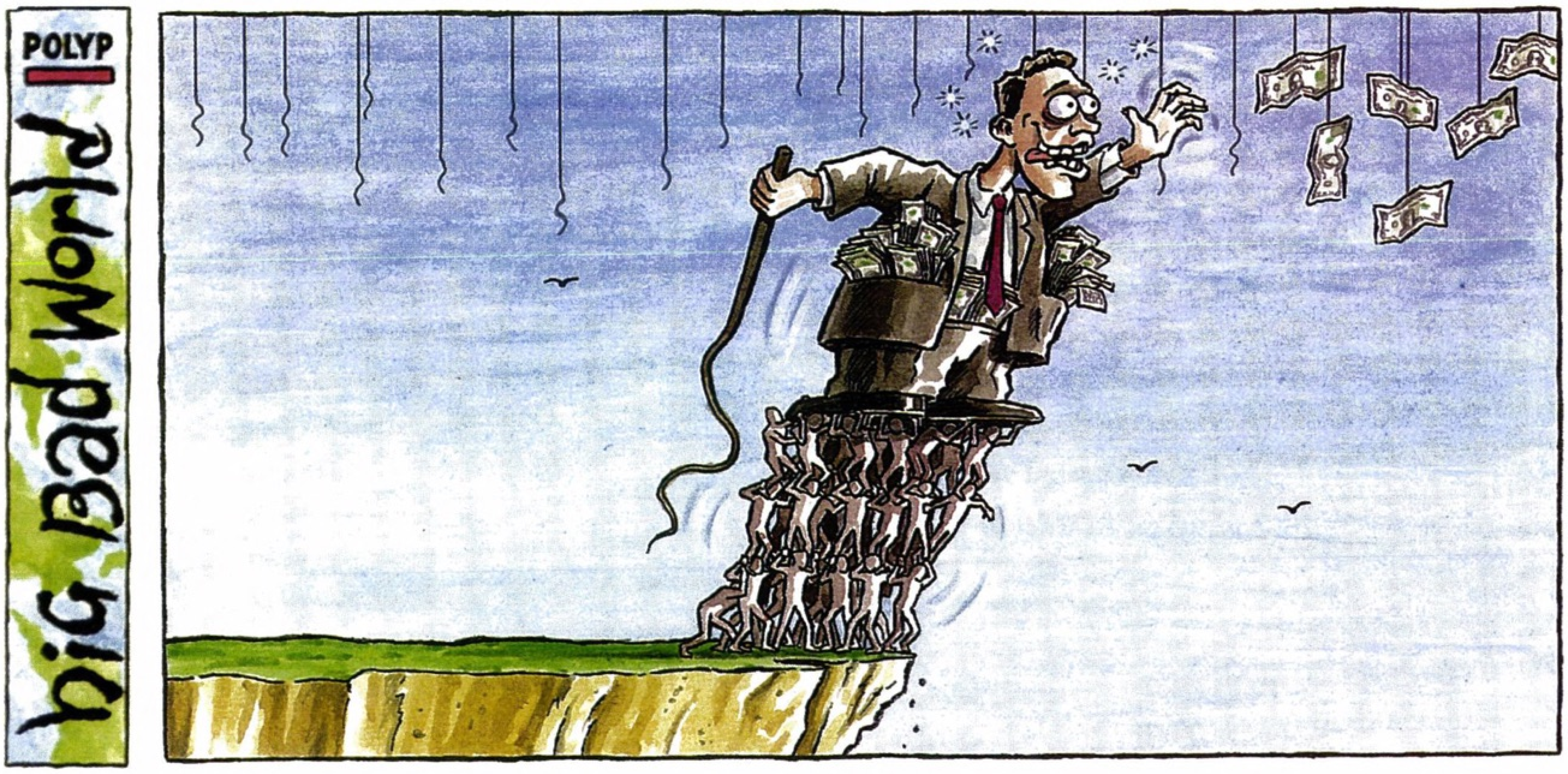
Puffins descend in protest at McVities in Harlesden, West London.

Ethical Consumer, No 42

The big drain

Tibet's third-largest lake, the sacred Yamdrok Tso, is being tapped for power by a four-turbine hydro-electric scheme. The freshwater lake will be drained as a result within the next 500 years, threatening the lake's ecology, wildlife and the life of local people who depend upon it. Most of the electricity will supply the new homes of Chinese settlers.

GreenLine, No 135



Update

MEXICO

Debtor's revolt

El Barzón fights to break the yoke

IN MEXICO there are two revolutions. 'One is armed, which is the one in Chiapas, and the other is unarmed, which is El Barzón,' says debtor Silvia González Román. She is referring to the debtors' revolution that is sweeping the country. Mexico's debtor problem is enormous. In January a study of 12 of Mexico's largest banks estimated that a staggering 30 per cent of loans were unlikely ever to be repaid. Representatives of Mexico's National Banking Commission estimated in mid-1995 that the net worth of the country's commercial banking system was a negative of $10 billion.

JOHN DEERE
LOS CAMPESINO
TENEMOS MAS
MIEDO AL BANC
QUE AL SIDA

'The *campesinos* are more afraid of the banks than of AIDS,' says the poster.

DAVID RANSOM

El Barzón – a *barzón* is a leather strap used to hitch ploughs to yokes shouldered by oxen – originated among ranchers in the northern Mexican states of Sonora, Chihuahua and Zacatecas, according to its leader Juan José Quirino Salas, a native Zacatecas farmer, rancher and businessperson. With the North American Free Trade Agreement opening up Mexico's markets to foreign products in 1994, these once-prosperous ranchers' incomes dwindled and their debts mounted. Seven ranchers decided there must be an alternative to either surrendering their properties to the banks or restructuring their loans on the banks' terms. With Quirino Salas' advice they set up a tent in front of Fresnillo town hall, where everyone could see debtors who were not ashamed of their debts. Within days they had enlisted about 1,000 members. Throughout 1994 the Barzonistas extended their geographical reach, with chapters founded in 19 of the country's 31 states.

'No-one does anything, because we are thousands of people who are well organized to fight the banks. We are the ones who produce goods, while the banks just act as intermediaries,' says Quirino Salas. 'It is ridiculous that they, through high interest rates, are strangling the hen that lays golden eggs, even as they demand that it keeps laying golden eggs.'

Debtor groups estimate that between one and two million Mexicans with non-performing loans – loans that are more than 90 days past their due date – have been organized to stand up to their bankers, and increasingly members are filing pre-emptive usury suits against the banks, to bog down the courts.

'I owe, I don't deny it, but I will pay only what is just,' is El Barzón's slogan. The group directs its members to make regular – albeit modest – payments to accounts overseen by judges. The banks are allowed to access these funds only if they agree to apply the money to the debt's principal.

El Barzón and the National Co-ordinating Committee of Bank Users pledge to continue their struggle until the Government and the banks acknowledge the futility of taking over thousands of homes, cars and businesses, dismantling the country's productive base and falling into an even deeper social crisis. They demand that the Government, banks, and other business groups enter into dialogue with debtor groups to find a way to resuscitate the economy

*From a longer report by **Andrew Wheat** in Multinational Monitor, Vol 17, No 6.*

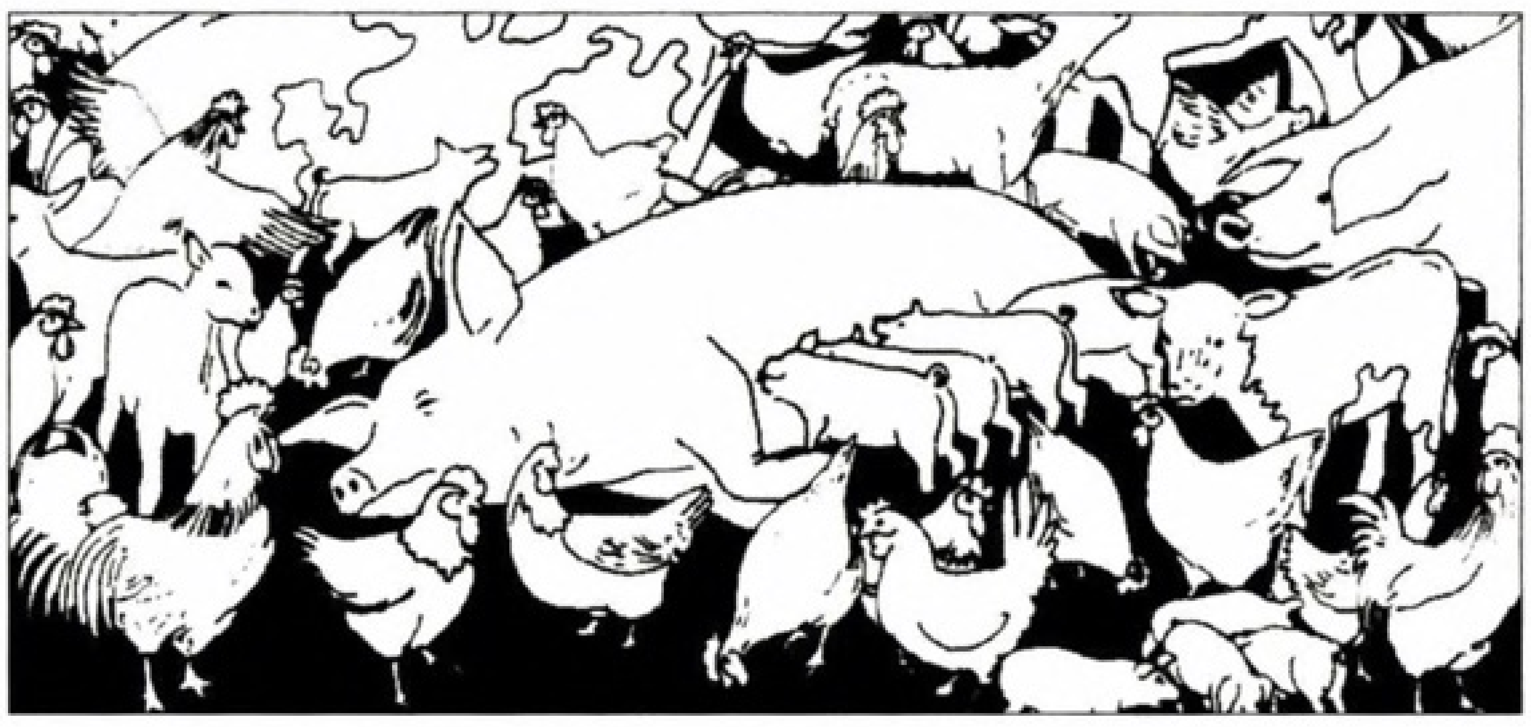
Justice!!!

Congratulations to Andrea Needham, Angie Zelter, Joanna Wilson, and Lotta Kronlid on their acquittal of the charge of causing criminal damage to a Hawk fighter jet that was destined to be used against the people of East Timor (Updates NI 281). **And congratulations also to the jury who felt that the women had acted lawfully to prevent British Aerospace and the British Government from aiding and abetting the crime of genocide in East Timor.**

Also flexing judicial muscle was the Zimbabwean high court which ruled that Gays and Lesbians of Zimbabwe (Galz) could open their stand at the country's international book fair, despite a ban by homophobic President Mugabe (also Updates NI 281). **However, regardless of this positive outcome, poor security at the fair and the presence of a politically motivated crowd shouting abuse and threats meant that Galz couldn't open their stand after all.**

Anti-mutilation campaign

Compassion in World Farming are campaigning for the British Government to stop turning a blind eye to the routine illegal mutilation of farm animals and start bringing prosecutions. Throughout August they ran a 'Mutilations Amnesty' when farmers were urged to hand in the crude instruments used to castrate, tail-dock and de-beak animals. The campaign focuses on painful, backyard operations which are carried out by non-vets without anaesthetic. Peter Stevenson of CIWF says: 'Tail-biting by pigs and feather-pecking by hens should be prevented not by slicing off pigs' tails and de-beaking hens but by keeping them in decent conditions. Farmers are systematically breaking the welfare laws; much of what they do is not only cruel but illegal.'



Compassion in World Farming can be contacted on: Tel: + 44 (0)1730 233904, Fax: +44 (0)1730 260791.

Quote

'You, the jury, have been called here to act as the conscience of our community... I ask you to look beyond the superficial appearance of shattered glass and of holes in an expensive aeroplane and to know what the *purpose* of that Hawk was. Ultimately we acted in order to save lives of people, people like you, people like us. What can be more *right*, more *just* than that?'

Closing speech to the jury by **Lotta Kronlid** one of the Ploughshares Four women who were acquitted of charges of criminal damage after disabling a Hawk fighter jet with household hammers.

Energy and Equality

What a mess! If the South uses energy in the same way as the North has done, we are heading for a future dominated by global warming, toxic waste and air pollution. But the arguments for sustainability do not necessarily go hand-in-hand with those for equity. **Vanessa Baird** constructs a conversation between ***Claire,*** from the energy-glutted North, and ***Gloria*** from the energy-starved South. Can they ever share the same priorities – and a common vision for the future?

QUICKLY, SHE MOVED out of the lecture hall, along the corridor and through a pair of swinging doors, violently at odds with each other. No time to think why it was always like this, before she reached the room with her plaque on it: Dr Claire Green, Senior Lecturer, Renewable Energy Studies. A student caught her eye. 'Can I talk to you?' 'Sorry. Can it wait till next week?' A tome slipped off her pile, 1160 pages of it, entitled 'Energy Forever'.

'God, I could do with just a bit of it right now,' she thought as she closed the door behind her and poured herself an evil-smelling, thick, black liquid from the coffee maker.

'Relax,' she told herself sternly, gazing out through the window at the Heart of England University campus. It was one of those sunny, windy days that should be a joy to a renewable energy freak. Her computer whirred quietly in the background. Next to it, her answerphone was flashing. She switched it to 'play' and heard her lover informing her that they had agreed to meet for lunch. *Remember?!* Before she could make the requisite grovelling, apologetic call, her phone buzzed.

'Your visitor from South Africa is here! Shall I send her through to you?'

Claire did not know quite what she had expected of Gloria Thembisa, community leader and NGO worker, with a special interest in rural energy. But when she appeared Claire realized what she had not expected: a woman six-feet-tall, wearing jeans and a big crimson, floppy shirt. Behind her large spectacles, Gloria had a slight squint that gave her a permanently quizzical air. But her smile lines were deeply etched, Claire noticed with relief. If she was going to spend five days accompanying this woman on a study tour of energy alternatives, a sense of humour would be a plus, if not an essential requirement.

After the initial polite exchanges Claire went to her printer and ripped off a list she had prepared the previous night. 'Just a few ideas about different kinds of energy systems your community might be interested in.'

'Ah yes, yes. Wind, solar, wave. Mmmm, solar hydrogen. Very interesting...' said Gloria. 'But there is something missing here. Something that really does interest me...'

'Ah yes..?'

'Nuclear power'

'Nuclear..?'

'Yes. You have heard of it?' said Gloria, with a smile.

'Yes,' Claire flustered. 'Do you want to...'

'Visit your newest nuclear power station? Yes, I would love to!'

Claire had a sinking feeling as she made the arrangements. 'Yes, we are open every day of the year except Christmas here at Sizewell,' said the chirpy voice on the other end of the line. 'You can book a tour now. And you will probably want to spend time in our Visitors Centre... It's one of the best in the country..' ■

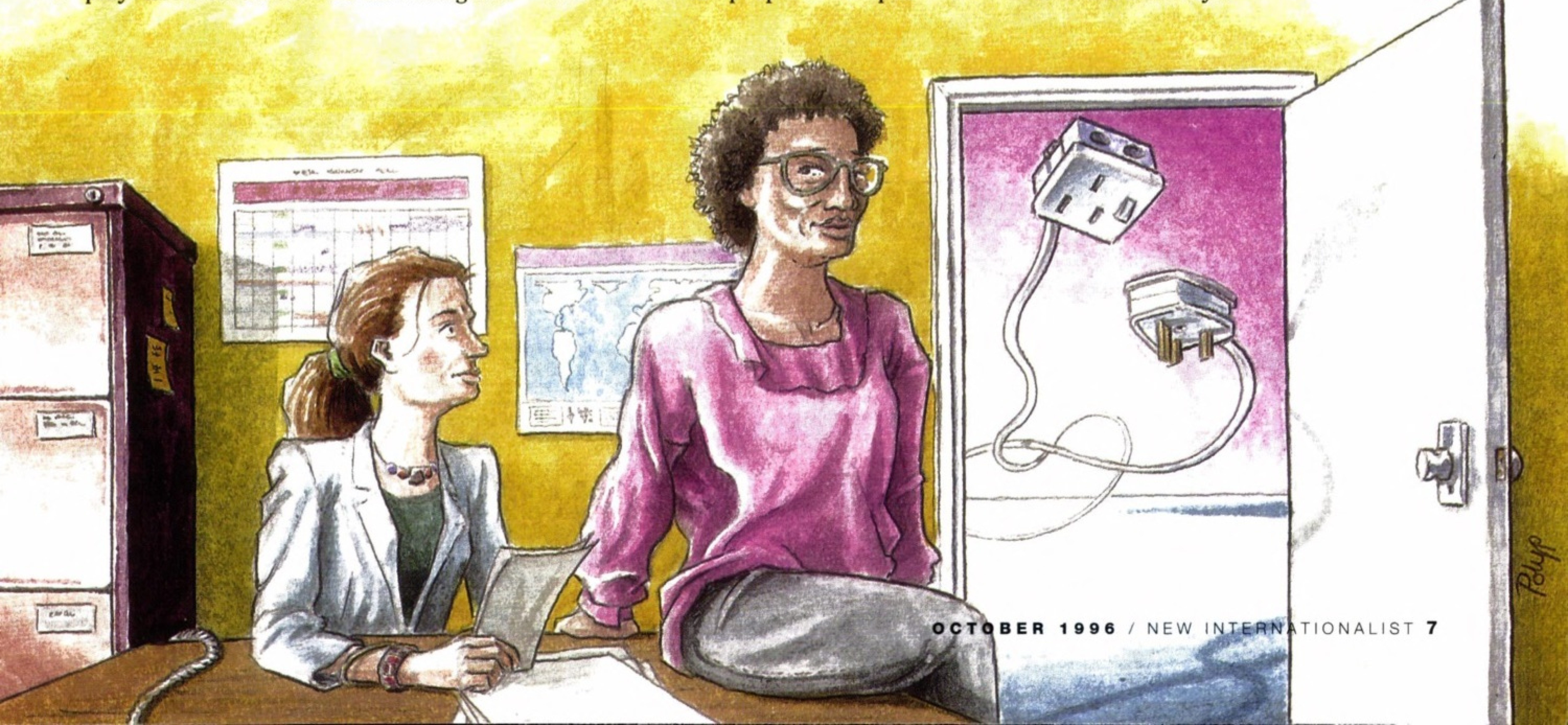


ILLUSTRATION: PJ POLYP

Go East, young atom

Claire and ***Gloria*** enter the realm of 'glow boys'... nuclear hard sell... and energy gluttony...

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ILLUSTRATION: PJ POLYP

EARLY FOR THE TOUR, they went for a walk along Sizewell Beach. In front of them, a little out to sea and resembling the truncated piers of a nineteenth century holiday resort, were the water in-takes and out-takes for the nuclear power plant's cooling system.

Just a few yards back from the beach were the two power stations themselves: Sizewell A, a concrete 1960s building housing an old Magnox reactor due to have been decommissioned a decade ago. The other, Sizewell B, one of the world's newest, biggest and most expensive nuclear power installations. A flagship for the industry, in the process of being sold off to the private sector, it was painted a tasteful French blue, its white dome gleaming against the dark grey summer sky.

Gloria and Claire made their way to the Visitors Centre where they were handed blue hats. 'Small ones for the ladies,' said the matronly woman in a floral patterned dress who was to be their guide. 'We call this type of Magnox reactor "the workhorse of the industry",' she said as they entered the main hall of Sizewell A. 'It was intended to have a lifetime of 20 years, but it is so productive and reliable we have kept it going.'

'What would be the cost of decommissioning it?' asked Claire.

'That's too complicated to go into,' replied the guide, moving quickly on to explain how fuel-rods worked.

For the tour of Sizewell B they had another guide. Same floral patterned dress, different woman. This power station was closed for 'routine maintenance work', they were told. Nearly 900 men had been brought on to the site to do the work – cleaning out, maintaining, replacing radioactive fuel-rods. They came from the US, France, and 'all over' and were 'experts', they were told.

'Glow boys,' whispered Claire to Gloria.

'What's that?'

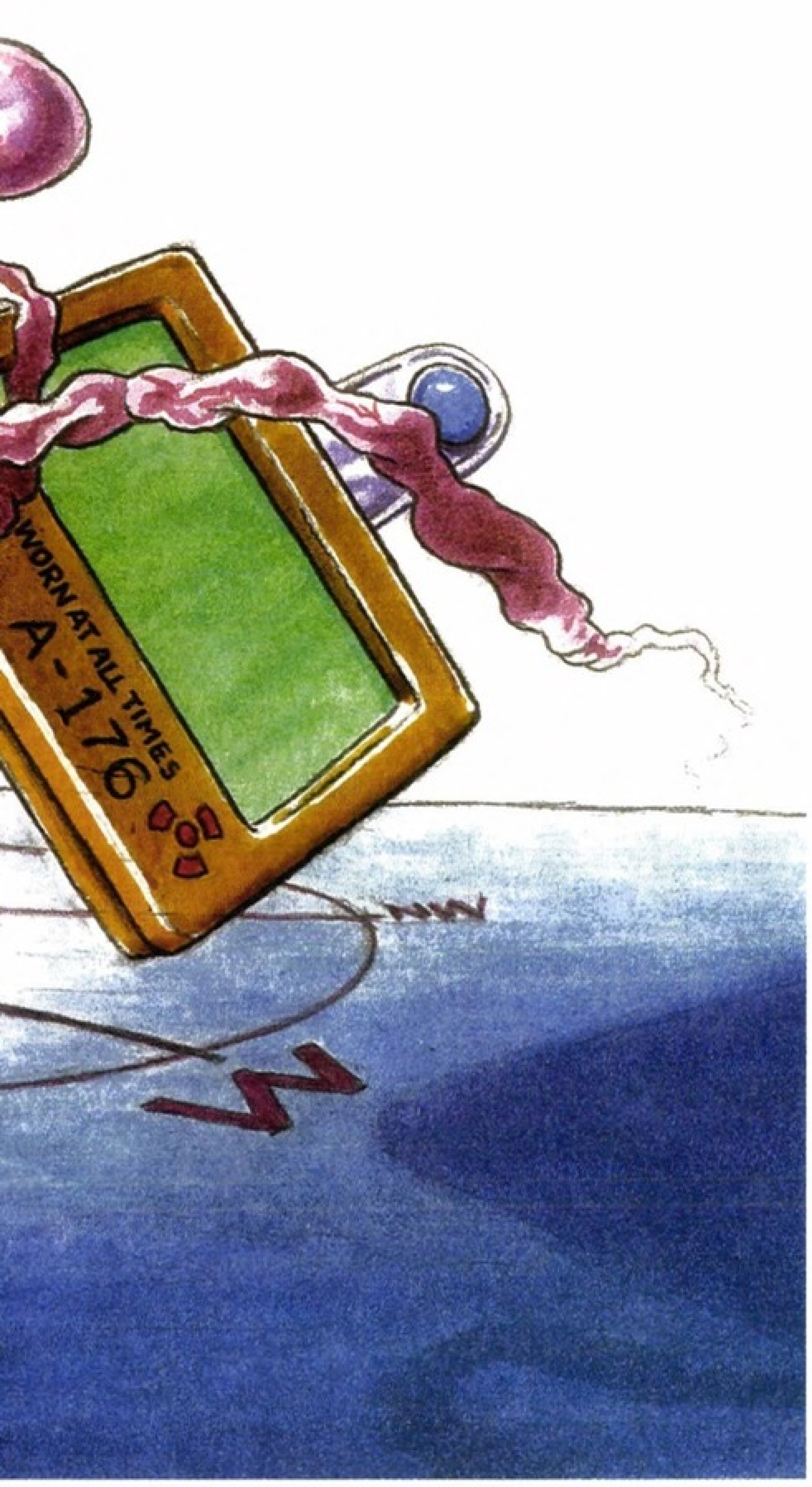
'Guys who are paid a lot of money to work with radioactive material. They go around the world doing it.'

'Records are kept of the radiation dosage of all the people who work in the power plant,' the guide was explaining.

Claire remembered seeing the records of a man she knew who had worked at Sizewell before his child was conceived. The baby developed leukaemia. But according to the records, and the official standard set, the father's dosages were okay.

'We go over the top on safety,' the guide repeated. 'We are rather proud of Sizewell B,' she went on, glowing. 'It's unique!'

The station was completed last year. The reactor is a Pressurized



Water Reactor built by the US company Westinghouse – the type used at Three Mile Island in the US, site of one of the world's better-known nuclear accidents.

'It's basically the same model but we have improved it. We have used French computer technology and made it even more safe. There isn't one like it in the world...'

'And isn't likely to be...' muttered Claire.

'What's that?' said Gloria.

'I'll show you later...'

On the way back Claire asked Gloria what she had thought of the tour. There was a long pause.

Then Gloria replied: 'Well, I think they are very keen to promote their plant.'

Back at the office Claire handed her a magazine article entitled 'Eyeing the East'.

'Where's this come from?'

'The New Internationalist...'

'Ah..' said Gloria, enigmatically, as she began to read:

EYEING THE EAST

The US company Westinghouse and British Nuclear Electric have lost their combined bid to sell their model nuclear plant based on Sizewell B to the Government of Taiwan. It failed to meet that country's procurement and safety requirements.

This is another blow for the ailing nuclear industry, which has virtually ground to a halt in the West. It is 18 years since a nuclear reactor has been ordered in the US, and none are being built in Canada or Australia. In 1995 the British Government decided there was no economic justification for public funding for new reactors and two proposed stations were cancelled. Even 'nuclear-happy' France has no 'new build' at the moment.

Until recently it looked as if Japan were the only industrialized nation still keen on nuclear power. It provides a third of the country's electricity and there are plans for another 5 stations in addition to the existing 49. But the tide of public opinion appears to be turning. With a two-to-one majority the people of the small town of Maki recently voted against the construction of a nuclear power plant on their doorstep. Other towns seem likely to follow suit.

There are three major problems facing the nuclear industry. One is the high cost of decommissioning power stations when they have reached the end of their intended lifetime, usually around 20 years. The Yankee Rowe reactor in Massachusetts, which cost over $186 million to build in 1960, was closed in 1991. To dismantle the plant fully will cost some US$370 million – a lot more than it cost to build. Naturally governments and energy companies favour extending lifetimes rather than footing the massive bill for closure.

The second obstacle is safety. Chernobyl and Three Mile Island are etched on the public consciousness and it seems unlikely that confidence will ever climb back to 1960s and 1970s levels. Nuclear watchers reckon it is only a matter of time before another large-scale accident occurs, especially if old outdated plants keep having their lives extended.

Even the newest technologies are failing the safety test. In December 1995 sodium coolant leaked from the Fast Breeder Reactor at Monju, Japan. This was meant to be the latest state-of-the-art, supposedly safe, technology. The nuclear industry's attempt to cover up the full extent of damage did little to help restore confidence.

Third, there is the growing and seemingly insoluble problem of what to do with nuclear waste – the 'back-end' of the process as it is rather graphically described. While this is essential it is hardly a profit-spinner. The commercial pressure for the industry is to build and sell new power stations.

'The future of the nuclear industry depends, in the short term, on exports,' admits Keith Parker of the British Nuclear Industry Forum, an organization that represents an international array of nuclear industries.

YOUR COUNTRY NEEDS NUCLEAR

In the 1960s nuclear was touted as a clean, inexhaustible system that would be so economic to produce it would be 'too cheap to meter'. Nuclear power now produces 17 per cent of the world's electricity but has not met its promises on cost by any stretch of the imagination. Even after Chernobyl a huge amount of public money has been – and continues to be – pumped into nuclear power. In 1990, according to the International Energy Agency, $3,936 million was spent on nuclear research and development, of which $857 million was for nuclear fusion, compared with just $550 million for all renewables, including solar, wind and hydro. Nuclear fusion might or might not come up with a better, safer way of generating nuclear power than fission, but signs so far are that it will probably cost about ten times more.

So the main sales pitch today is that nuclear power is good for you because it's 'clean'. Unlike fossil fuels such as oil, gas and petroleum, it does not produce the carbon emissions that contribute to global warming and the greenhouse effect.

The other pitch is 'You need it'. The people who are currently being informed they 'need it' are the decision-makers in Eastern Europe and Asia. China, South Korea and Taiwan all have plans to increase their nuclear power programs. Vietnam, Thailand and the Philippines have recently expressed interest. The company – or increasingly, international consortium – that brings the best finance package is likely to win the contract.

According to Roger Hayes, Director General of the British Nuclear Industry Forum: 'There is a tremendous export market for Western companies in countries like China, Indonesia and Vietnam. All this is driven by population and industrial growth and increasing energy demand. So despite minor opposition in some places, they know there is no choice. They have to have nuclear energy as part of the portfolio.'

People living in Korea and Taiwan

might not agree. In these countries public resistance to nuclear power, and particularly to radioactive dump sites, continues to mount.

And what about the safety implications of building more nuclear plants in Asia?

'China is an issue,' says Hayes. 'They are going hell for leather for nuclear power and there is a bit of a risk that for pricing reasons they could cut corners and go for a Soviet reactor at a certain price. But I don't think safety is going to be a big problem in China. I think a far greater problem will be if they don't use nuclear. Then they are going to use their coal and that will be far more polluting. China is already about to take over from the US as the world's biggest polluter.'

The safety implications for the world of more nuclear power plants in areas of instability or in countries where there is not what the industry calls 'a safety culture' does not worry Roger Hayes unduly. 'Ours is a dangerous world. And we will share safety technology with them. There is also training available.'

TWO MORE CHERNOBYLS

These words may ring somewhat hollow to people living within wind-blowing distance of Chernobyl. The disaster there on 26 April 1986 unleashed a plague of cancers and affected, either directly or indirectly, nine million people in the former Soviet Union. The effects continue.

According to Anna Syomina, director of MAMA-86, a pressure group set up by mothers of children with radiation-related sicknesses, as many as 70 per cent of Ukrainian children are born with birth defects and of the 30 per cent born healthy only 20 per cent are still healthy.

'Previously, when my mother's friends came to see her, they laughed a lot and talked mostly about art and politics,' says Aleksandr Sirota, aged nine at the time of the accident. 'Later, their conversation was most concerned with their children's illnesses and with grief in their families and the families of their friends and acquaintances.'

The financial cost of the accident has been estimated at between $283 and $358 billion, making it the most expensive disaster ever.

But it's right here, in Ukraine, home of Chernobyl, that the nuclear industries of the West have set their sights. Earlier this year the G7 countries – Canada, US, UK, France, Germany, Japan and Italy – agreed to fund the closure of Chernobyl and the completion of two new nuclear plants in Ukraine – Khmelnitsky 2 and Rovno 4 – to replace it. This will cost one billion dollars. It's deemed the 'least cost' option.

Environmentalists and non-nuclear energy experts are not only concerned about safety, but also argue that the power is simply not needed.

Ukraine has the dubious accolade of being the most energy-intensive country in the world. It uses ten times more energy per capita than Japan and seven times more than the US. The most simple no-cost, good-housekeeping energy conservation measures, which have been applied in the West for decades, would lead to an energy saving of ten per cent – that is three-per-cent more energy than produced by Chernobyl.

The trouble is that by focusing on managing supply rather than demand, energy over-capacity will only increase and there will be no incentive to move in the direction of energy efficiency. It would make a lot more sense to pump the money into new local, energy efficiency industries, such as making energy-efficient lightbulbs – something already successful in Poland. Or as the Ukrainian Institute of Electrodynamics points out, windpower could be developed to provide 40 per cent of current nuclear output.

DOUBLE STANDARDS

Patching up dubious old Soviet plants is another market contract-hungry Western nuclear industries are keen to enter. In Mochovce, Slovakia, construction of a nuclear plant that started in 1984 came to a halt in 1991 due to lack of finances. The European Bank for Reconstruction and Development drew up plans to complete it. But the Slovak Government ditched them because the safety requirements were too costly. Instead a consortium consisting of French Framatome and German Siemens have undertaken to do the work with a 40-per-cent lower safety budget. What this means, in effect, is that French and German companies are taking part in a project which will not raise Mochovce to Western safety standards. Yet the involvement of Western companies will give the impression that this is being done.

Siemen's nuclear arm needs the work. Since the disaster at Chernobyl no new power plants have been completed in Germany. Mochovce will provide the company with a showcase of what it can do for many other nuclear reactors – and there are some 60 of the same type in Eastern Europe alone.

'YES, BUT WHAT DO the people in Eastern Europe want?' said Gloria, putting down the article. 'Or is it just Western environmentalists from Greenpeace making a fuss...?'

'No, Eastern and Western environmentalists are working together on these issues. And there have been a

Guard at abandoned housing near Chernobyl. Two new nuclear plants are being built to replace Chernobyl and provide power which is 'not needed'.

ANDERS GUNNARTZ / PANOS PICTURES

number of anti-nuclear protests in Eastern Europe. There was a big one in Hungary recently to try and stop the dumping of German nuclear waste in the city of Paks. But the campaign against Mochovce is one of the most concerted. Let's check the Internet when we get back and see if there's anything about it,' said Claire. The modem buzzed and after a brief search the following appeared on the screen, from Juro, a Slovakian activist.

'Copy this letter and send it via e-mail at the very least. It will take you mere seconds, but it can have a tremendous impact. The European Bank for Reconstruction and Development is out of the project partially thanks to some 200,000 letters and cards protesting their participation. Help us.

Siemens
Attn: Dr Heinrich von Pierer
Wittelsbacherpl 2
80333 Munchen, Germany
Fax: 89 234 42 42
Email:
roland.huegel@mchw.siemens.de

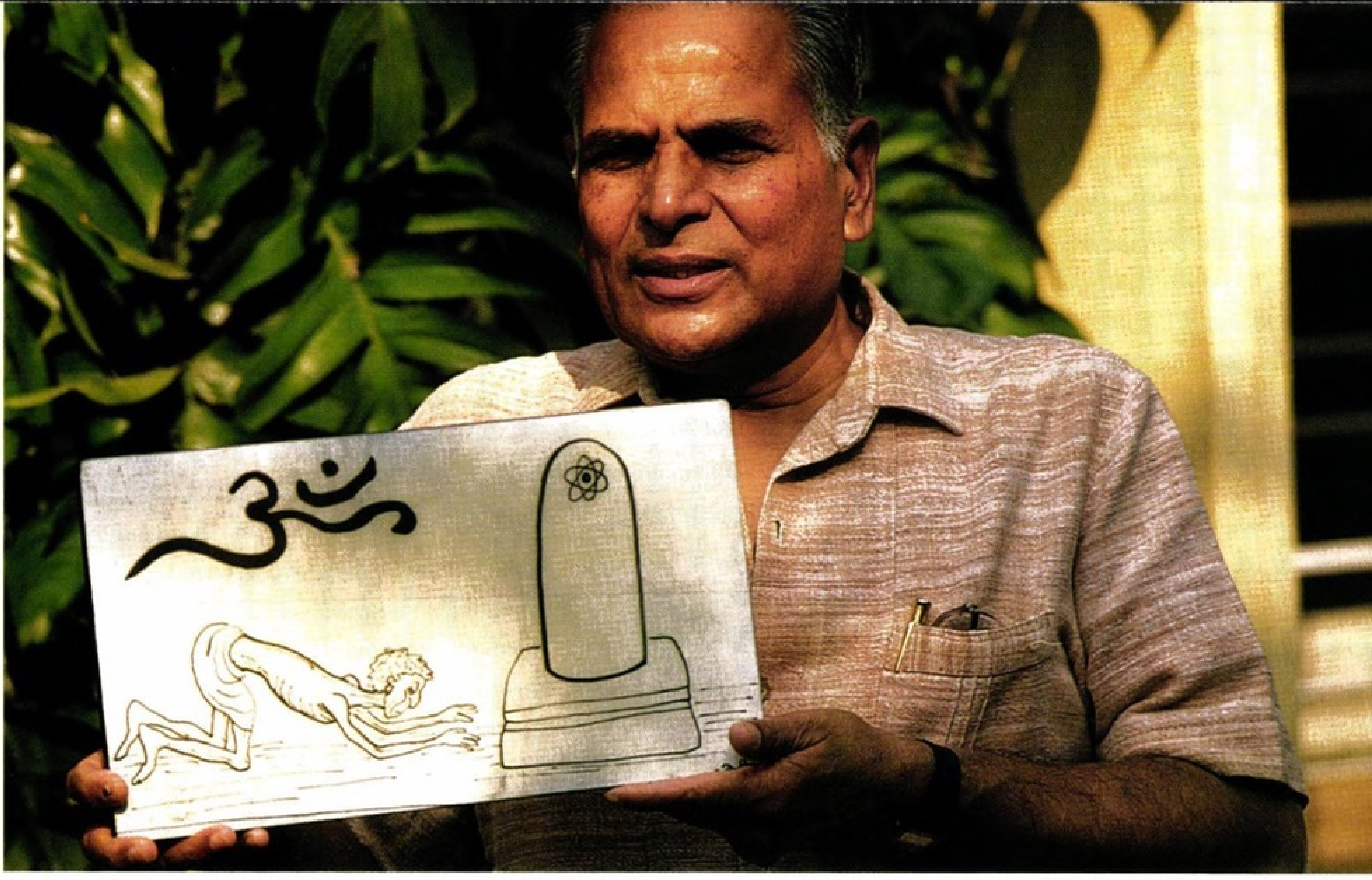
Dear Dr. Pierer,

Siemens' corporate image is being tremendously damaged because of your willingness to take part in the completion of the Slovak nuclear power plant. It is obvious that neither your company nor any other is able to upgrade Mochovce's safety to acceptable standards.

Mochovce would not get a licence to be operated in the EU nor in the USA. It would be impossible to build Mochovce somewhere in Munchen: do not take part in a project which could not be acceptable in your country. Drop the double standards. Mochovce is not the most cost-effective method for the Slovak energy system. There are many options of cheaper and more environmentally friendly energy production. By halting your participation in the Mochovce project, you will contribute enormously to nuclear safety in Slovakia and Central Europe.

It may be business to you, but it is dirty money you want to earn. I want to let you know until you halt your participation in the Mochovce project, I will boycott your products. I will not buy Osram, Siemens Nixdorf, and Siemens products...

Stop Mochovce!
ZaMatkuZem
For Mother Earth, Slovakia
-Golded 2.50 Unreg



Challenging faith in atomic power: India's leading anti-nuclear energy activist Professor Dhirendra Sharma.

TRYGVE BOLSTADT / PANOS PICTURES

'OK,' SAID GLORIA. 'So in Eastern Europe they have surplus capacity and unsafe nuclear reactors. It's crazy to go on building up nuclear capacity there. But that's not the case in my country. In South Africa we have eight million people homeless and 60 per cent of our people have no electricity. We need houses and we need power – lots of it. And if it has to be nuclear, many people will say: "so be it". If nuclear companies come to us with attractive financing proposals, why should we turn them down?'

'But do you have to copy our mistakes?' Claire was becoming quite animated. 'We have been screwing up the environment for 25 years! Huge power stations, economies of scale that don't exist! Phenomenal wastage in domestic and industrial use! Estimates vary but if we were using energy wisely we could be doing the same things with at least 30-per-cent less power than we currently use!'

'That may be true for you. But what would you say to a rural woman who spends her day looking for firewood and whose life would be transformed if she could just hook up to the electricity grid? Or to women I know whose families suffer from respiratory problems because they rely on coal and kerosene to heat and light their homes? Look, we want to develop, properly, in a way that will benefit all the people. We want to electrify the country. To do that we need power stations. Coal-fired, gas-fired, nuclear-fired power stations.'

The colour was rising in Claire's cheeks. 'But you have a real window of opportunity to do things differently! Why close it? You have a program to build homes for eight million people. You can use energy-efficient models and methods and so lessen the demands for new power stations. Look,' she was pulling out a file from her drawer. 'Are you familiar with this study? It's from the International Institute for Energy Conservation.' A photo of a rural house with the North-facing wall painted white, and windows of different sizes depending on their relation to the sun, fell out. 'This is passive solar-energy heating in rural South Africa. Simple but ingenious,' she said, picking it up. 'And it saves on fuel bills.'

Gloria laughed. 'It's very nice. I like white walls too. And conservation sounds good. But we can't conserve what we haven't got.'

'Haven't you got it? You have a lot of power already, and lots of it is wasted by tremendous energy inefficiencies in South African industry. Your steel industries, for example, use 50-per-cent more energy per output than in Western Europe. And you have sun and wind and water, don't you?'

'Plentifully.'

'Use those.'

'Maybe sometime in the next millennium but our deadline is the year 2,000!'

'But you can leapfrog now! You can go straight to the technologies that are clean and cheap and renewable. You can go directly to ways of using energy that are efficient. People are doing it now, in lots of places in the Third World!'

'Oh yeah? Show me!'

Claire sat down at her computer and brought up a file. The answer-machine was flashing.

'Oh my God, I forgot. My partner!'

Gloria laughed, sitting on the edge of Claire's desk.

'Ah, here it is... one I prepared earlier...' Claire brought up onto a screen something she been putting together for her students. 'It's not quite finished yet. I've called it Leapfrogging.' ■

Leapfrogging

Why make the same old mistakes? Many people in the 'Majority World' are 'leapfrogging' – going straight for sustainable, renewable energy technologies rather than down those well-trodden but dirty paths of coal, oil, gas and nuclear.

Renewable energy technologies are driven by the natural energy flows of the planet. They do not deplete the world's finite energy resources and sensibly used don't risk destroying the environment.

THE FLOW OF POWER

A LIGHTBULB swings above Juan and José as they do their homework. 'They have a chance of a good education now,' says their grandmother, Maria. 'They have a future.'

For six months of the year the Andean village of Chalán in Northern Peru is cut off from the nearest town, Celendín. Candles are expensive so villagers used to go to bed when it got dark. Now all that has changed, thanks to the village's new micro-hydro scheme.

Hydroelectric power is a dirty word in more enlightened development circles. But on a small scale it's quite another matter. Nearly everyone in the village was involved in building their micro-hydro scheme, with help from the UK-based development agency Intermediate Technology. And the power goes directly to homes, school, workshops, the health clinic, even to the local dentist. He says his running costs have dropped by 90 per cent! Anticipating the demand that the Chalán example would generate in the surrounding area, Intermediate Technology has funded a workshop in the town

HARTMUD SCHWARZBACH / STILL PICTURES

Solar power is ideally suited to nomadic lifestyles.

HI-TECH NOMADS

HAVE *YURT*, yak, solar panel; can travel. Mongolian nomads are attaching a new feature to their *yurts* (or tents) these day – photovoltaic cells. Solar technology is actually ideally suited to a nomadic lifestyle. Mongolian nomads, who constitute nearly half the country's population, move their tents (*yurts* or *gers*) about 30 times a year, covering vast distances with their herds of horses, yaks, goats, sheep and camels. Solar panels can be set up and function anywhere – providing there is sun. Not a problem in a land with an average 300 sunny days a year.

When the sun doesn't shine, temperatures can drop as low as minus 30 centigrade. But, as though to compensate for this, photovoltaic cells work even better in extreme cold, and the snow reflects additional light.

Traditionally, rural families have depended on wood fuel or animal dung and candles for all their cooking, heating and lighting needs. Now renewable energy is the centrepiece of the Mongolian Government's strategy to bring electricity to rural families, and so slow down the drift from highlands to cities. A single 40-60-watt solar module can provide a nomadic family with five hours light, four hours television, and fifteen hours radio per day. Several hundred photovoltaic systems have now been installed in the country. In the capital Ulan Bator, the Research and Production Corporation for Renewable Energy has been busy assembling and distributing these systems – which come from Europe, the US and China – and evaluating their performance. The Mongolian Institute of Physics and Technology, meanwhile, is pursuing a photovoltaic research programme of its own.[1]

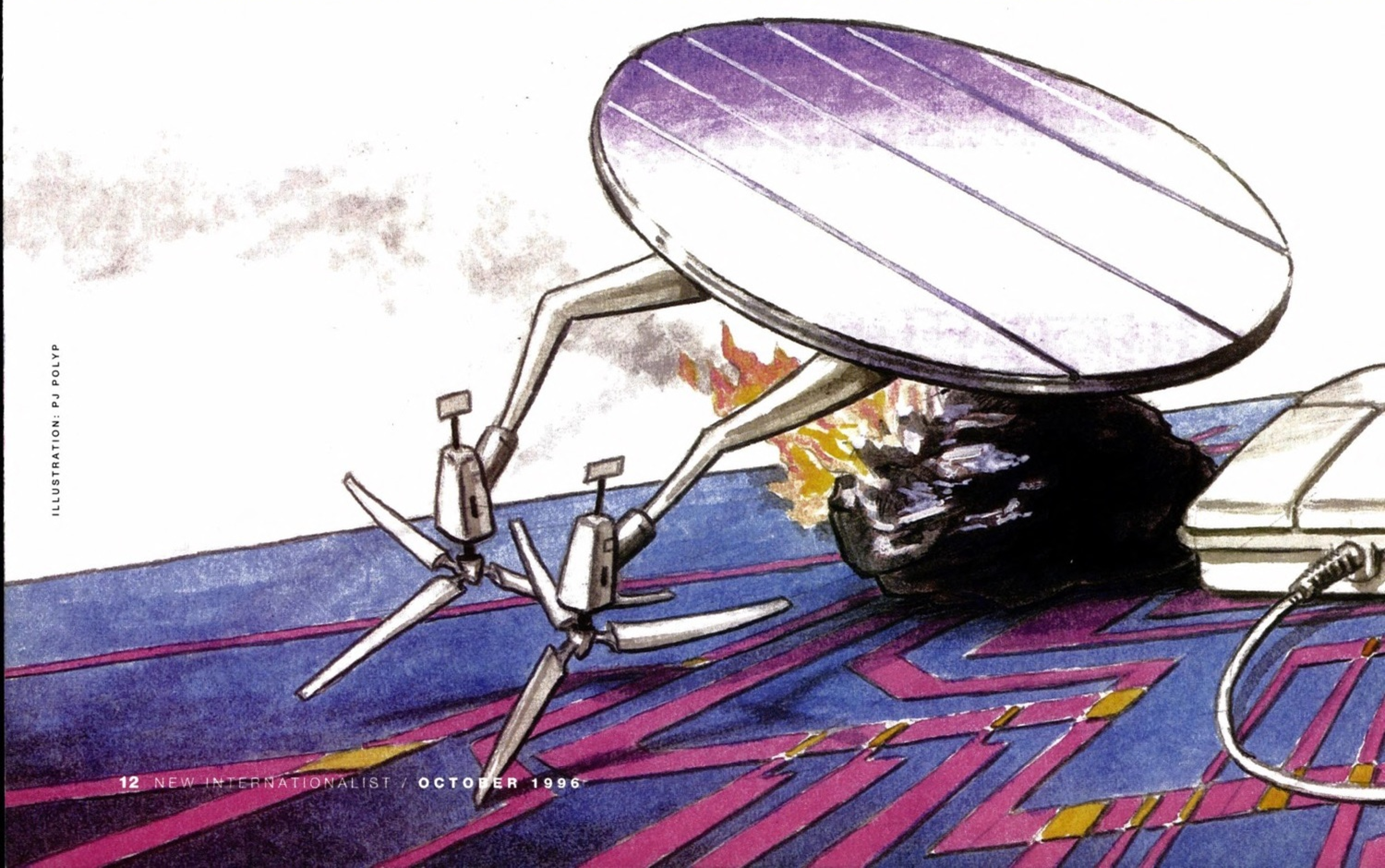


ILLUSTRATION: PJ POLYP

Micro-hydro is bringing electricity – and jobs – to the Peruvian highlands.

of Cajamarca to make the turbines and equipment necessary for micro-hydro schemes.

Micro-hydro is bringing change to other parts of the world too. In the Himalayas, the Hilly Hydro Project has ingeniously gained World Bank funding. In view of the World Bank's famed preference for mega-schemes, hundreds of separate, environmentally-friendly, micro-schemes have been packaged to look like one big project. The micro-hydros will bring power to remote mountain communities and relieve the pressure on firewood in an area which is being rapidly deforested.[2]

THE LIGHT OF LIFE

Solar-powered clinic in Adi Quala, Eritrea.

THE SUN CAN be a problem in the arid parts of Africa – but it is being turned into a solution. Keeping vaccines cool in remote rural areas without electricity has been a major headache for health workers on the continent, especially those involved in the World Health Organization (WHO) immunization program. But today in Eritrea, Zaire, Sudan, Uganda and other African countries it is increasingly common to see solar-panels on the roofs of health clinics in even the most remote villages. The sun is being used to run refrigerators, to sterilize operating instruments, and provide lighting after dark.

Until recently most villages on the African continent were without access – or with only interrupted access – to electricity from a national grid and were forced to rely on diesel-fuelled electricity generators. But this is expensive and the supply of diesel is not always reliable – as the Eritreans discovered during their war with Ethiopia in the 1980s. Ethiopian pilots regularly strafed Eritrean fuel supplies from the air. At that time a group of Eritreans came to a small alternative-technology company called Dulas in North Wales and asked them to devise a solar cooling system. They designed a solar-powered refrigerator which has since won WHO approval and can now be found in many parts of Africa.

In Bulape – a remote village in Northern Zaire – health workers are finding the solar power they use for sterilizing their operating instruments has spin-off benefits. They can also make distilled water with it and use the stream this generates for cooking. All this in a village so inaccessible that all solar equipment had to be carried 40 miles by people on foot.[4]

BOTH PHOTOS: DULAS ENGINEERING

POTENT RUBBISH

RESPECT THE DUNG, the chaff and the refuse heap. They may be sources of light, warmth and livelihood. In the village of Pura, in the South Indian state of Karnataka, local people are making use of refuse to generate electricity for their homes, bring water to their taps and to make a first grade fertilizer for their market gardens.

Before 1987 the village was connected to the state grid, but few households could afford the electricity. This is the case in most Indian villagers, where only about a fifth of households are rich enough to be connected. Then came the biogas plant. The beauty of it is that it is community-owned and controlled and produces electricity so cheap that anyone can use it. Furthermore, maintaining and supplying the plant provides jobs for local people.

From dung to gas to light. A rural biomass digester in Pakistan.

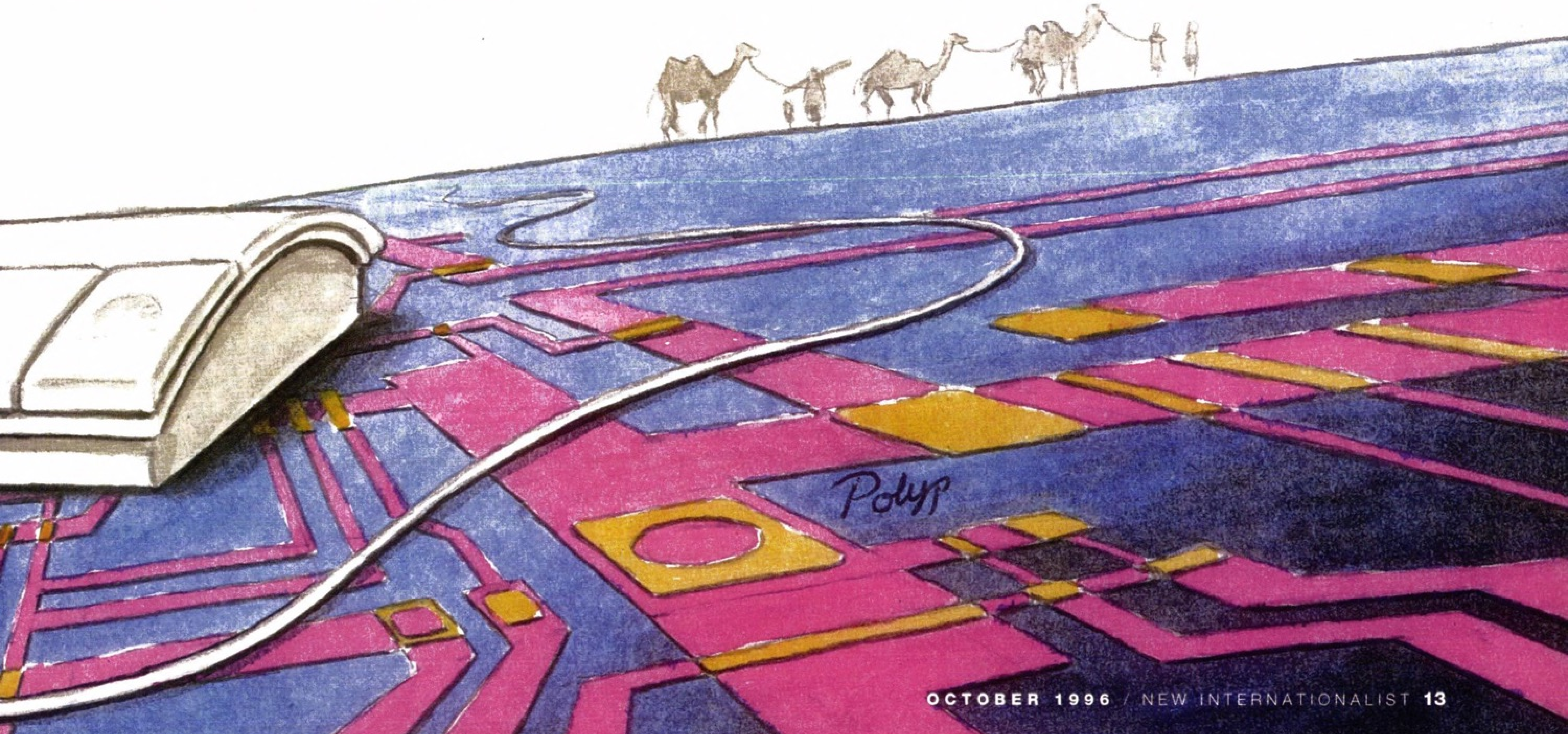
JIM HOLMES / AXIOM

The design of the plant is simple and it can be made from local materials, consisting of an inverted drum which digests animal and agricultural wastes. This produces a gas: 60-per-cent methane and 40-per-cent carbon dioxide, which is used to fuel engines that in turn drive generators to produce electricity. Villagers are provided with electricity in their homes and water pumped to various points around the village, considerably reducing the traditional burden of work for village women. Another part of the plant produces a high-quality, odourless manure fertilizer. The Pura example is one of a wide variety of low-cost biogas plants that exist throughout the Indian subcontinent.

Collecting dung in an Indian village: a lot less burdensome than searching for firewood.

STEVE COX

Small biogas plants are also common in China. There they acquired an unpleasant reputation during the 1960s due to leakage caused by poor construction. But this has been improved and they are becoming more common again, especially in the south and west.[3]



130,000 wind-driven generators – and more to come in China's wind program.

BLOWING IN THE WIND

WINDPOWER IS TAKING off in China – and it's good news for the rest of the world. The most populous nation in the world relies overwhelmingly on coal-fired power plants, which has sent pollution levels soaring over the country's industrial regions. But 120 million Chinese living in more remote areas, are still beyond the reach of the national power grid. Now there are plans to promote windpower in these regions. China already has 130,000 small- and medium-sized wind-driven generators and four major windpower stations. Officials say windpower will play an important role in China's effort to distribute power across the country. It makes both economic and ecological sense. Windpower demands less investment and has far more flexibility in operation. The energy ministry has worked out an ambitious plan that will pump up the total capacity of wind-driven generators to a million kilowatts by the end of the century and to eight million kilowatts by 2020. Wind-powered pumps are also being used extensively in Africa for irrigation purposes.[5]

TROUBLES WITH ALCOHOL

BRAZIL PROVIDED ONE of the most grand and daring forays into the field of renewable energy. In 1975 it launched its *Pro-alcool* program aimed at switching all motor vehicles to ethanol made from sugar cane instead of petroleum. By 1980 production of gasoline-only vehicles had been halted and had been replaced either by neat alcohol engines or gasohol engines burning a mixture of 78-per-cent gasoline and 22-per-cent ethanol. Ethanol is far less polluting than oil and air quality in cities like São Paulo improved markedly. It also made Brazil less dependent on the import of foreign oil and so had a positive impact on the balance of payments. However, in recent years the program has suffered serious setbacks as a result of depressed oil prices, an increase in the production of domestic oil and the failure of growers, distillers and government to agree on a fair price for ethanol. A salutary reminder that powerful lobbies and conflicting economic interests can tear apart some of the best-laid schemes. But the Brazilian program has paved the way for similar, albeit more modest, schemes in other countries such as Zimbabwe.[6]

Tanking up on alcohol: Brazil's plan was technologically sound but ran into financing problems.

ALCOOL
GASOLINA
BRITANNIA

GETTING THE LAW-MAKERS ON BOARD

INDIA IS GOING through something of a 'renewable energy boom'. Scientists and environmentalists are lobbying hard to get one of the most progressive pieces of energy legislation in the world through Parliament. The draft law – which was close to being passed before the Government changed earlier this year – proposes:

◆ mandating the use of solar water-heating in public buildings and the use of passive solar techniques in the design of new buildings.

◆ levying taxes on all private conventional power to fund research and development work in conservation and decentralized power generation.

◆ giving priority to rural energy programs based on renewables, with financial incentives to encourage decentralized projects.

Wind, sun, revolution. These women are using passive solar water-heating in the southern Indian state of Karnataka.

Solar, wind, small hydro and biomass projects are popping up at an extraordinary rate in India, many the result of international collaboration. But fossil-fuel power-plant emissions are expected to increase dramatically. If renewables do not kick in as a major source, Asia will easily surpass all of Europe and the US in sulphur dioxide emissions by the year 2000.[7]

TOP LEFT CLOCKWISE: CHRIS JOHNSON / PANOS PICTURES; JØRGEN SCHYTTE / STILL PICTURES; MARK EDWARDS / STILL PICTURES

Sources: 1 Anthony Derrick, IT-Power. E-mail: itpower@gn.apc.org and Dr Chadraa Battaryn at the Institute of Renewable Energy (IRE), PO Box 52/40, 210152 Ulan Bator, Mongolia.Tel/Fax: 976 1 342377 **2** Steve Fisher and Olly Paish, IT Power. **3** P Rajabapaiah, S Jayajumar, Amulya KN Reddy in *Renewable Energy* ed. Thomas B Johansson et al. **4** Dulas Engineering, Machynlleth, Wales., UK and IT-Power. **5** d+c Germany, March and April 1996. **6** José Goldemburg, Lourival C Monaco, Isaias Macedo in *Renewable Energy* ed. Thomas B Johansson et al. and *Renewable Energy: Power for a Sustainable Future* ed. Godfrey Boyle. **7** Dr P Venkata Ramana, TERI India, e-mail pvramana@teri.ernet.in and Dr V Bakthavatsalam, Indian Renewable Development Agency.

FOSSIL FUEL FAREWELL

Discomfort one hundred

Gloria and ***Claire*** are off to see an energy statistician who lives on the other side of London. The pair hit the road – and the road hits back. Will they ever reach their destination? Is an end to fossil fuel folly in sight?

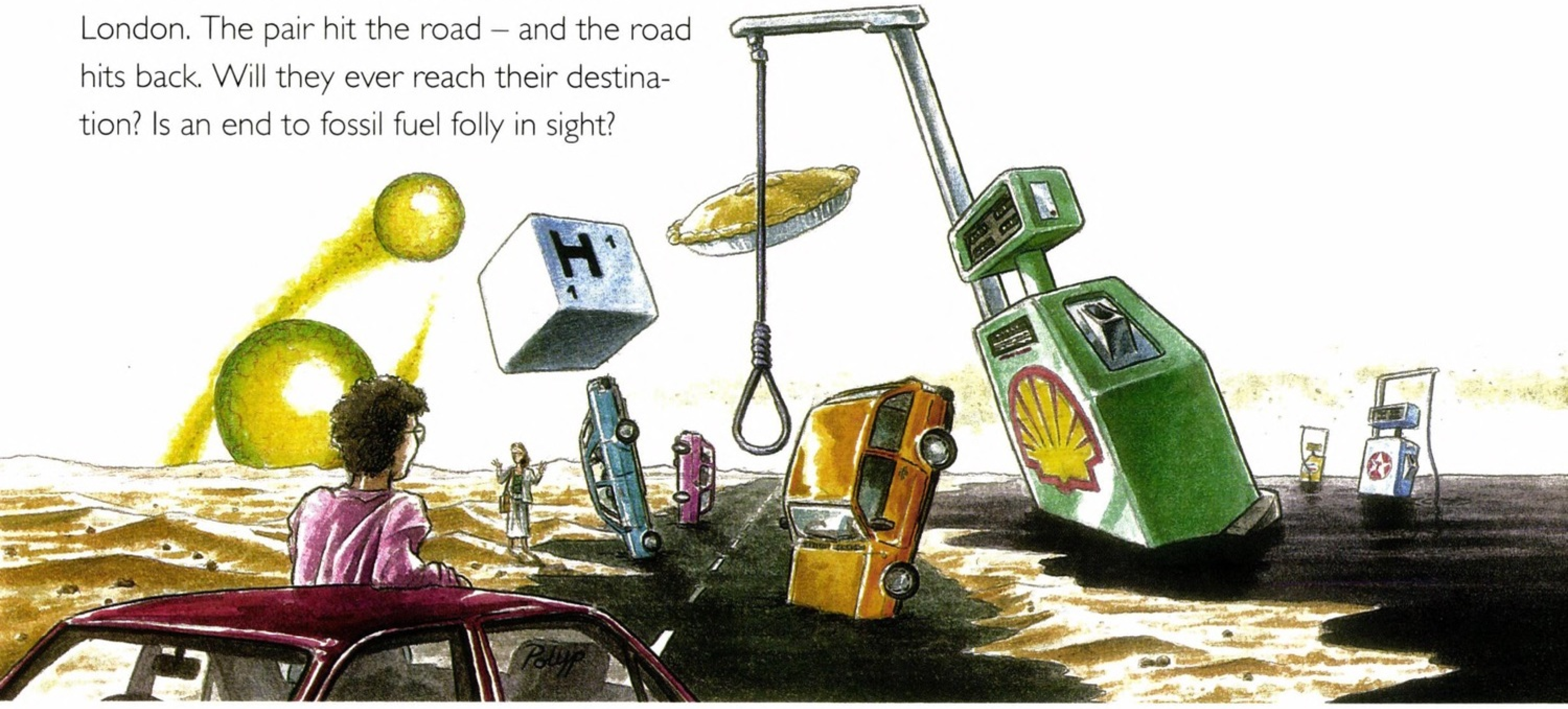


ILLUSTRATION: PJ POLYP

IT WAS ONE OF THOSE scorchers. Low on air quality, high on noxious oxides. Claire and Gloria had been stuck in a traffic jam for longer than either cared to remember. The spanking new highway had been built to relieve traffic congestion – and was already making its mark as a long car-park.

'This is unbearable,' said Gloria, somewhat to Claire's surprise. 'Shall I open the window?'

'Okay,' Claire replied. 'Let them all in...'

'Uh?'

'Ah, here they come... Carbon dioxide – to give us global warming; nitric oxide, nitrous oxide – to eat our lungs' spongy structure and give us bronch-itis and emphysema; sulphur dioxide, sulphur trioxide – for a spot of acid rain; peroxyacylitrate – for swelling of the larynx, irritation of the eyes and possibly cancer; carbon monoxide – the suicide's favourite – for headaches, dizziness, confusion and ultimately death...'

'Thank you for the information...' said Gloria tersely. There was a pause. 'Anyway, why didn't we go by public transport?'

'There used to be a rail service – before privatization...'

They edged along, then ground to a halt again.

'It could be worse,' said Claire cheerfully.

'Oh yeah?'

'Well, in Bangkok – which has probably the worst traffic jams in the world – the best-selling item is the Comfort 100. A car potty. I hear they have recently introduced another model, a twin version called the Comfort 150.'

Gloria squirmed uncomfortably.

There was a blast of horns. Two drivers were snarling at each other, engaged in a bout of road-rage. 'Constipation induced?' wondered Gloria.

'It's true,' said Claire, with a sigh. 'Hell is other drivers...'

They edged along again, reaching a dizzying 20 miles an hour at one point. Coming up to a Shell filling station they saw graffiti of a hanging man painted on the hoardings. 'Save Ken Saro Wiwa' the slogan read.

'I need to fill up but I'm not buying from there...'

'Are there any oil-producing countries that don't have a bad human-rights record?' pondered Gloria.

'A colleague has been working on the connection with fossil fuels and tyranny.'

Gloria laughed. 'Oh come on! You can blame fossil fuels for a lot but...'

'Well think about it. Major oil-producing nations: Saudi Arabia, Iraq, Nigeria, Indonesia, Burma. All of them are ruled by dictatorships with appalling human-rights records with only muted international criticism because the world needs their oil. It figures: a concentration of energy resources means a tremendous concentration of political power. And the sudden wealth from petro-dollars only encourages corruption. And it goes even further...'

'Does it have to?' said Gloria weakly, recognizing the importance of what was being said but feeling herself somewhat oppressed by a combination of exhaust fumes and the way in which Claire's voice was rising as she spoke.

'Yes. Look at the power of the oil multinationals. Companies like Texaco, Amoco and Shell call the shots because the world's economy depends on them.

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Sanity in Curitiba: the Brazilian city's people-centred transport system is cheap and eco-friendly.

JOHN MAIER / STILL PICTURES

Government subsidies keep oil prices down in the industrialized North, enabling it to maintain a productive advantage over the South. Oil importers of the South pay far higher prices. Gasoline and diesel cost more in India, Ethiopia and Kenya than in the US. Now if the sources of energy were decentralized, if it came from the sun and the wind, that would lead to greater political decentralization too...'

'Mmm,' said Gloria, who felt a headache coming on. Whether thanks to carbon monoxide or Claire's hectoring she was not sure. The traffic edged along again. She tried to stretch her legs. 'They don't make cars for Africans!' she yawned, flicking through a bunch of papers Claire had given her.

'I don't believe it!' she suddenly exclaimed. 'Have you seen this? "China has announced plans to move towards an automobile-centred transport system. There are proposals to ban bicycles in some Chinese towns because they get in the way of cars!"'

'The Chinese are buying cars like there's no tomorrow, and at this rate maybe there won't be.'

'They want what people in the West have got. It's outrageous!' Gloria cast Claire a sideways glance.

'It's true that when it comes to carbon emissions we haven't a leg to stand on. We produce three-quarters of the stuff...'

'And I don't see that many bicycles on your roads. Driven off by the cars? Effectively 'banned' already? Yours is hardly a people-centred transport policy...'

'Ah, that's a good one,' interrupted Claire. 'The one you are holding now. It's a report from Curitiba, Brazil. A success story – and very much people-centred.'

THE CURITIBA CURE

Curitiba is a city of paradoxes. People living there pay a lot less for public transport than in other Brazilian cities, yet travel faster, use less gasoline and suffer less pollution. How? Their 'integrated mass public transport system' came into operation in 1974 and has proved a success. Instead of letting the market and private operators call the shots, the Municipal Authority imposed a 'trinary' road system, consisting of central slow traffic arterials with exclusive corridors for buses, plus lateral freeways where traffic moves rapidly in opposite directions.

Today there are 50 kilometres of exclusive corridors for express buses. If the integrated system did not exist, Curitiba would need 28-per-cent more buses and the city would be more congested and polluted with a more expensive and less efficient public transport system. People who had cars or could afford taxis would use them, causing much more congestion and pollution. Just business as usual in the average Third World city!

(Source: Jaime Lerner)

'BUT PEOPLE LOVE their cars,' protested Gloria. 'I don't think you are going to stop them using cars just by providing good public transport. And even public transport is pretty polluting... I mean, look at that bus...' She pointed to a wheezing monster that had just issued a choking, black cloud.

'Ah well, that's where zero-emission vehicles come in,' said Claire resolutely.

'Ah yes, I've heard of them... electric cars that crawl along at a snail's pace and take hours and hours to recharge...'

'Not any more. Scientists at the University of New South Wales in Sydney have produced a car battery that can be recharged in a matter of minutes. But actually, I think the future may lie in hydrogen fuel-cell rather than electric battery-driven vehicles.'

'Oh, yes and what pollution does that produce?'

'Nothing. Just water...' Claire foraged further in her bulging briefcase. 'Here it is. I pulled this off the e-mail just before we came out. It's a piece by a researcher called **Ben Lane**.'

ROAD TO ZERO

In California, the State's Environmental Protection Agency has legislated that by 1998, two per cent of all new cars sold must be 'Zero-Emission Vehicles', rising to ten per cent by 2003. That's the good news.

The bad news is that the big three US car makers – Ford, Chrysler and General Motors – have launched a sustained lobbying campaign to scale down California's demands. They argue that electric cars cannot match the performance of petrol cars and that without a technological breakthrough, electric cars will stay unsold in the showrooms. But technological breakthroughs have already been made. There are a number of possible clean-fuel options but the one that is really capturing the imagination of environmentalists and vehicle designers is based on the simplest, lightest and most abundant element in the Universe – hydrogen.

Hydrogen can be produced by simply running an electric current through water to split into hydrogen and oxygen. This is called electrolysis and we have known how to do it since 1800. Hydrogen provides three times more energy than petrol and can be released in a modified internal combustion engine. Most important of all, it emits no noxious fumes – just pure water!

A recent breakthrough has opened up a new possibility – which involves doing away with the internal combustion engine altogether and using a lot less hydrogen. Instead a Proton Exchange Membrane Fuel Cell is used. This device is made up of a group of metal hybrids – including iron and titanium – which absorb hydrogen. The gas becomes part of the metal's structure, making negligible the risk of explosion. This fuel-cell performs the process of electrolysis in reverse: it generates electricity from hydrogen and oxygen. That electricity is used to operate an electric motor.

Hydrogen technology is well and truly coming of age. Since 1993, the world's first hydrogen fuel-cell bus, made by Ballard Power Systems, has been carrying passengers on the streets of Vancouver in Canada..

More promising still is the New Electric Car from Daimler-Benz, unveiled this year. It's a modified Mercedes with a fuel-cell and hydrogen fuel tanks in an extended roof space. This car can go 70 miles per hour and

has a range of 155 miles. It could be a commercial reality within ten years.

In California's Palm Desert, meanwhile, solar power is being used to electrolyze water and produce hydrogen, then used in cars that do a petrol equivalent of 130 miles per gallon and require only two minutes to refuel.

Whether motor companies will be prepared to press ahead with mass production of 'clean' vehicles depends on political and consumer pressure. Change could happen very fast!

Of course we also need to break our dependency on individual cars. But even with the promotion of cycling and public transport, there will be some need for individually-owned vehicles.

Ben Lane, E-mail:
BML5@tutor.open.ac.uk

'FINE, IF YOU are living in the North and can afford a Mercedes Benz,' commented Gloria.

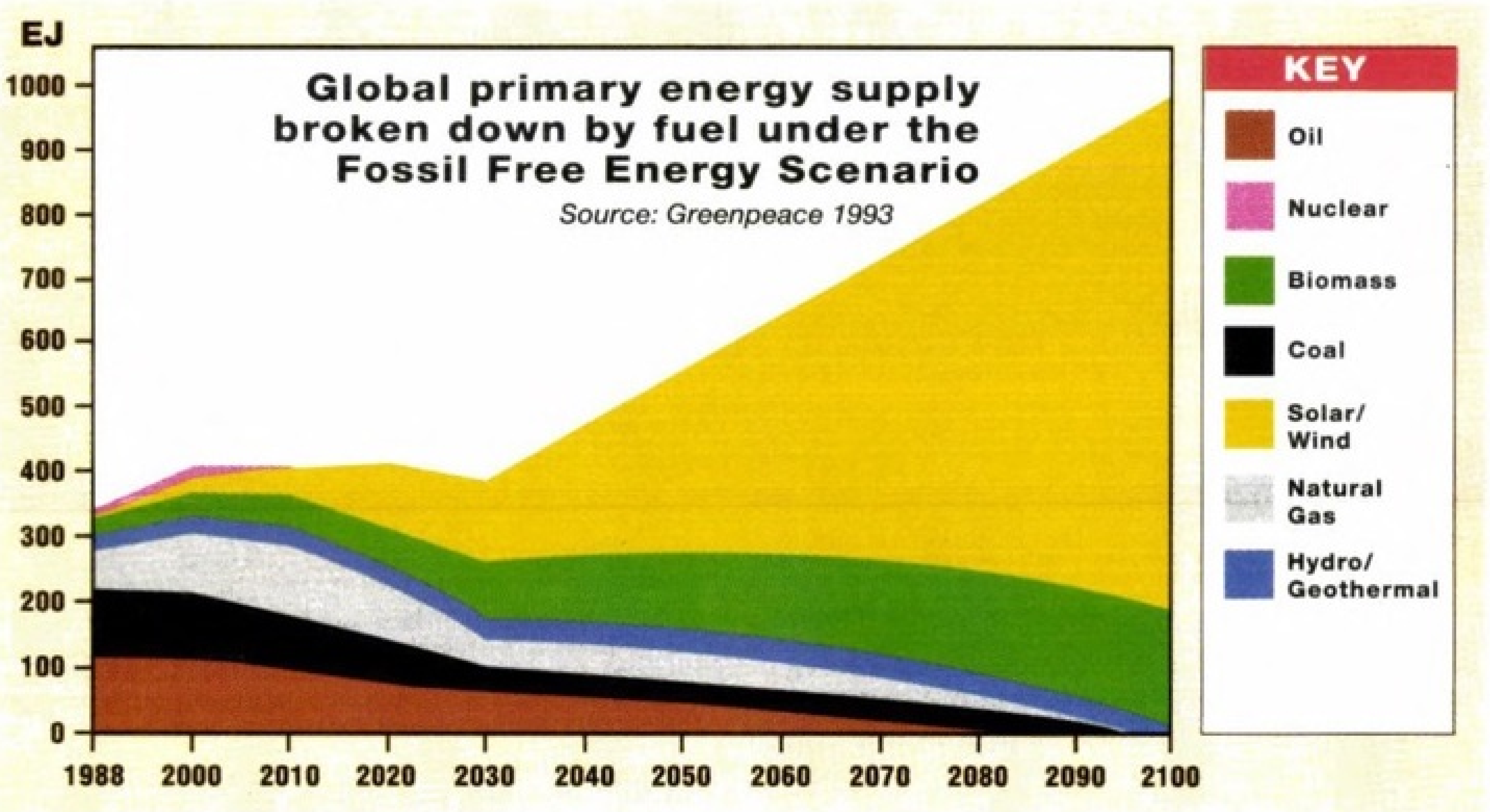
'Ah... here's one that might interest you then,' said Claire pulling another paper out from the stack on Gloria's knee.

WELCOME, SOLAR BABY

'Developing countries need efficient affordable cars that do not pollute or add to traffic congestion. Enter Solar Baby, a joint venture by Peerless Developers in India and Frazer Nash in England. Looking like a glorified golf cart, Solar Baby is a four-wheel drive vehicle propelled by low-cost, highly efficient lead-acid batteries and a solar panel on its roof that trickle-charges the batteries. Fully charged, Solar Baby can cover about 60 to 75 miles at a top speed of 44 mph. The car was designed specifically for use in cities as a taxi or delivery service.

Source: Frazer Nash Research Ltd, Tel: (+44) 1372 363688; Fax 1372 363926

'MMM. IT'S GOING to take a hell of a lot more than a few nice little inventions to get the world off fossil fuels. Especially petro-chemicals. They are mother's milk to an industrial society,' said Gloria, putting down the e-mail.



'Mother's ruin if you believe in global warming...'

'A big 'if', if I may say so...'

'There is a powerful lobby arguing that global warming isn't happening, but most of the world's scientists believe it is.

'According to the latest report from the UN Intergovernmental Panel on Climate Change the slowdown in global warming observed from 1990 to 1993 has come to an end and concentrations of greenhouse gases are still rising and warming the surface of the earth. And anyway, even if there were no global warming we would still have to protect human health from the rise in emissions as the world's population increases. Look at Mexico City – so polluted the World Health Organization smog limits are breached for 80 per cent of the year.'

'Well, that is as it may be. But the economic reality for industrializing countries like Mexico or South Africa or China or India is that many of us are sitting on huge deposits of fossil fuels. We have another 200 years worth of coal in South Africa. Are you going to tell us we should not use it? Are you going to try and stop India using natural gas? Are you going to convince Mexico that it should leave its oil reserves in the ground? All that stored-up concentrated energy just lying there in the earth and a world economy geared up to use it.'

'Oh there is no denying that fossil fuels are wonderfully convenient,' conceded Claire. 'And though oil reserves are getting low, coal and gas are going to be around for a long time yet... Perhaps we could use them in a limited, controlled way to plug the gaps in other energy systems. But not as the main system. For that we can use renewables which could also easily be produced in the South. Some people argue we don't need fossil fuels at all and could phase them out completely by the end of the next century...'

She leaned back and foraged in another case, handing over yet another document: 'The things you carry around with you!' muttered Gloria. 'I wonder how much energy is consumed and waste produced each year by environmental researchers churning out reports...'

Then she dipped into this report from Greenpeace:

FOSSIL-FREE ENERGY FUTURE

'Detailed analysis conducted for Greenpeace by independent analysts – the Boston Center of the Stockholm Environment Institute and others – demonstrates both the technical and economic feasibility of phasing out fossil fuels in order to control climate change...

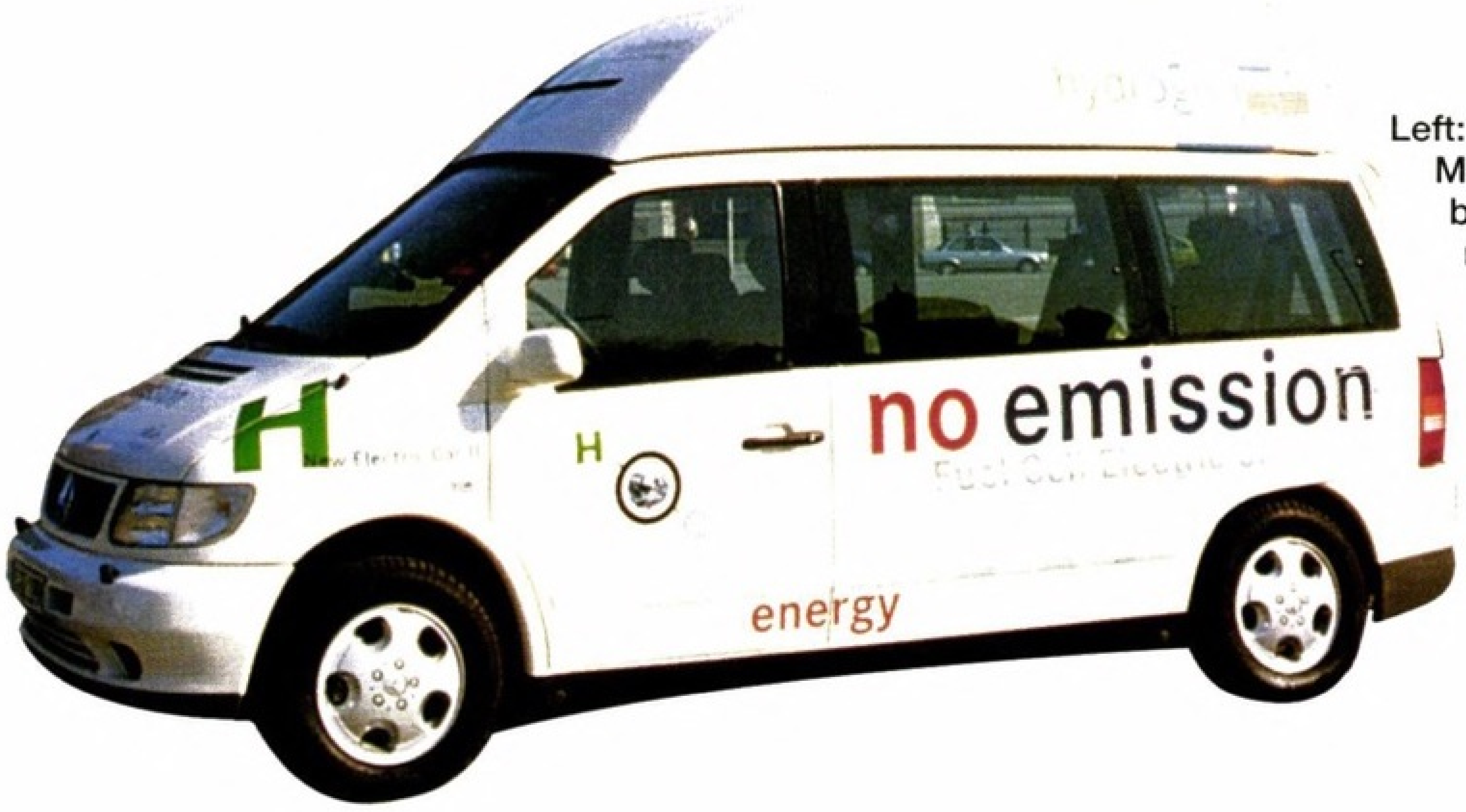
In the analysis global carbon dioxide emissions from fossil fuel use fall by more than 50 per cent within 40 years and a 100 per cent by the year 2100. The bulk of the early carbon dioxide reductions are in industrialized countries which are the largest current emitters.

The phase-out of fossil fuels is made possible by the rapid implementation of energy efficiency, together with renewable sources such as solar, wind, biomass, small-scale hydro and geothermal power. Renewable energy, currently delivering 14 per cent of global energy supply, would provide more than 60 per cent by 2030, and all the world's energy needs by 2100. Nuclear power would be phased out by 2010. The study proves that to phase out fossil fuels and nuclear power is both technically and economically possible. All it needs is political will.'

'PIE IN THE SKY,' said Gloria. 'All this talk about renewables. I'd like to see it in practice.'

Claire pondered. 'Let me take you to the Centre of Alternative Technology in Wales.'

'Why not? It will be nice to get out into the country – if we ever get off this road that is...' ■



Left: No-emission Merc which could be a commercial reality within ten years. The hydrogen fuel tank is in the roof.

ENERGY THE FACTS

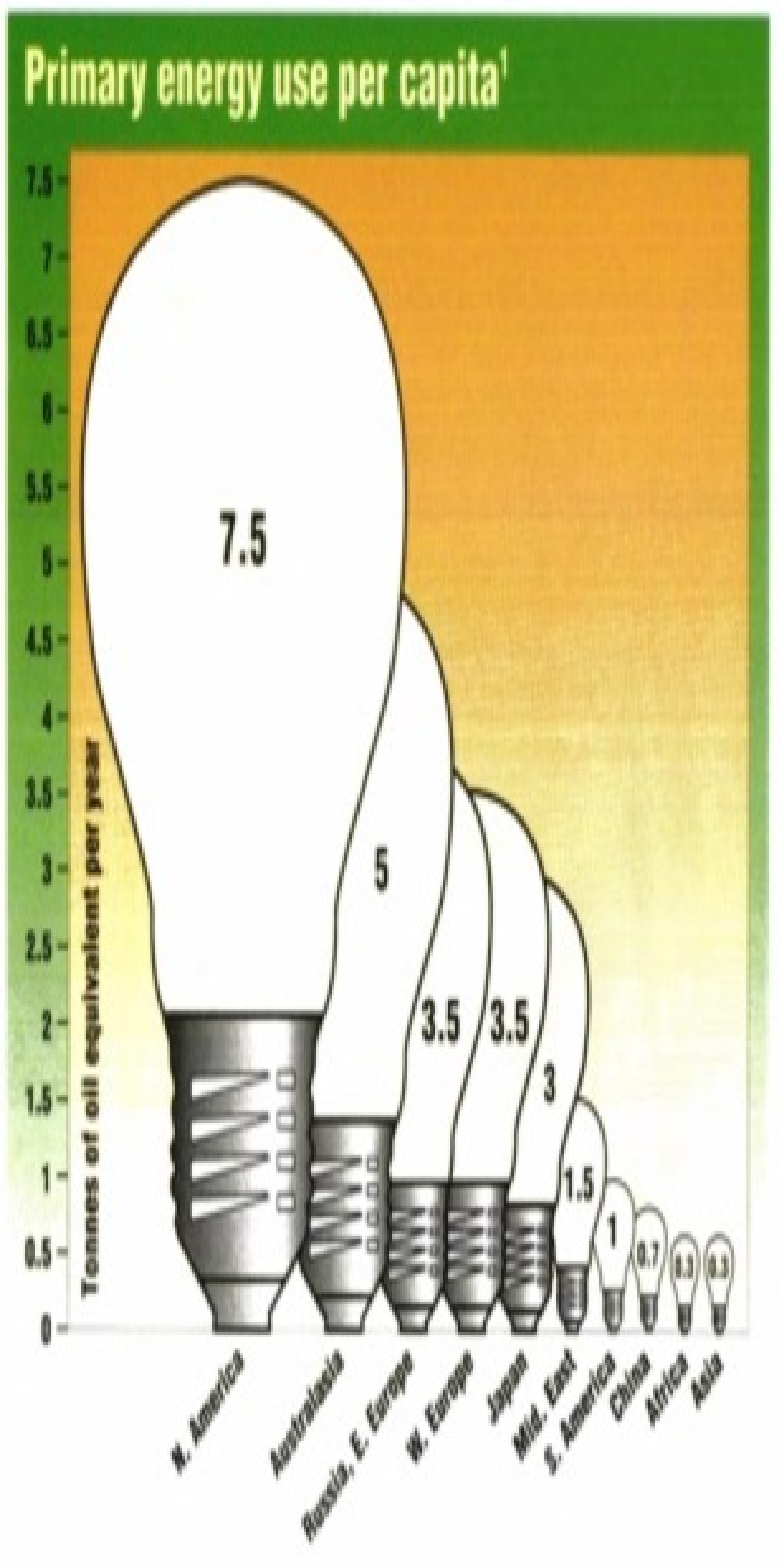
◆ WHAT IT IS ◆

THE BASIC PHYSICS: Energy can be neither produced nor destroyed, but can only be converted from one form to another. This is known as the FIRST LAW OF THERMODYNAMICS.

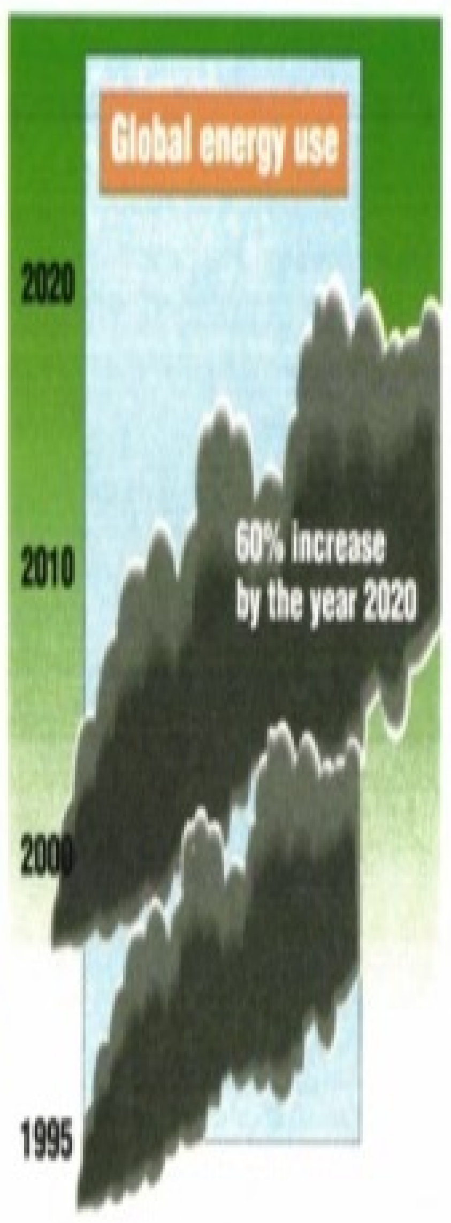
With every conversion of energy from one form into another, conversion losses occur. Because of these losses, heat and other emissions are released that bring disorder or entropy. This is known as the SECOND LAW OF THERMODYNAMICS.

CONSUMING HABITS

A QUARTER OF THE WORLD'S POPULATION – IN THE NORTH – CONSUMES MORE THAN 70 PER CENT OF THE WORLD'S COMMERCIAL ENERGY WHILE THE REMAINING THREE-QUARTERS – IN THE SOUTH – CONSUME LESS THAN 30 PER CENT.[1]



◆ Two billion people in the South have no access to electricity.[2] But a combination of industrialization and population growth in the South is set to increase global energy consumption by 60% by the year 2020.[3]

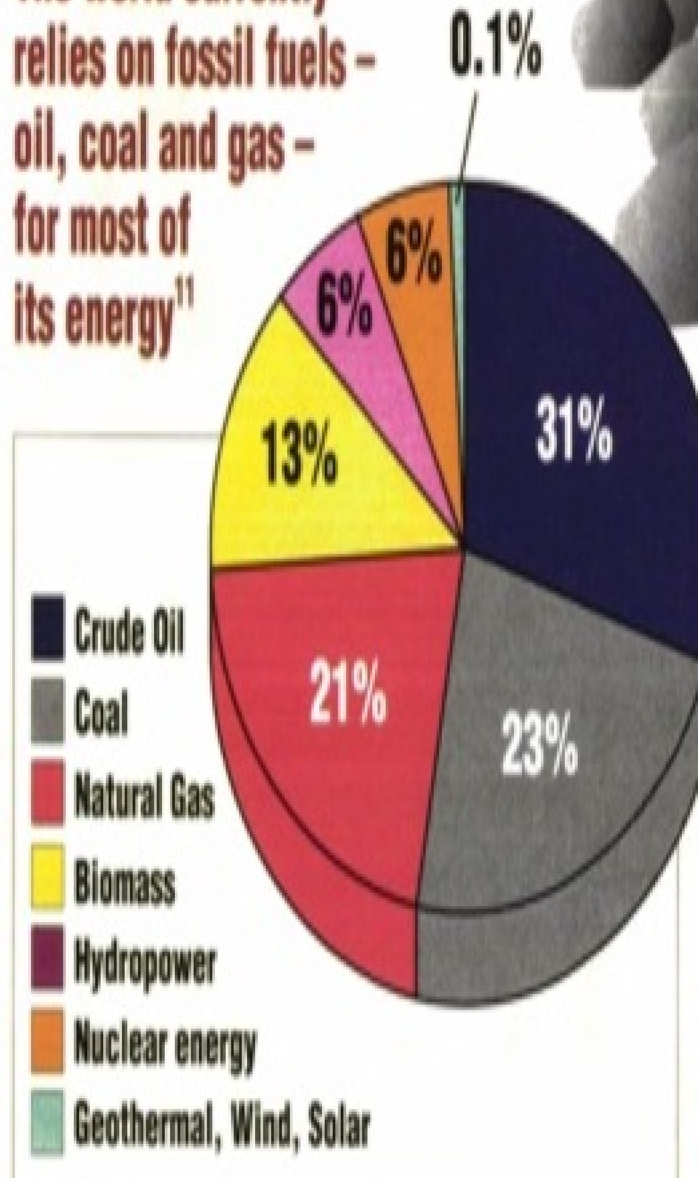


MOTOR MANIA

VEHICLES ACCOUNT FOR HALF THE WORLD'S OIL USE.

There are 680 million vehicles on the planet, increasing at the rate of more than one every second or one new car for every two babies born[4]

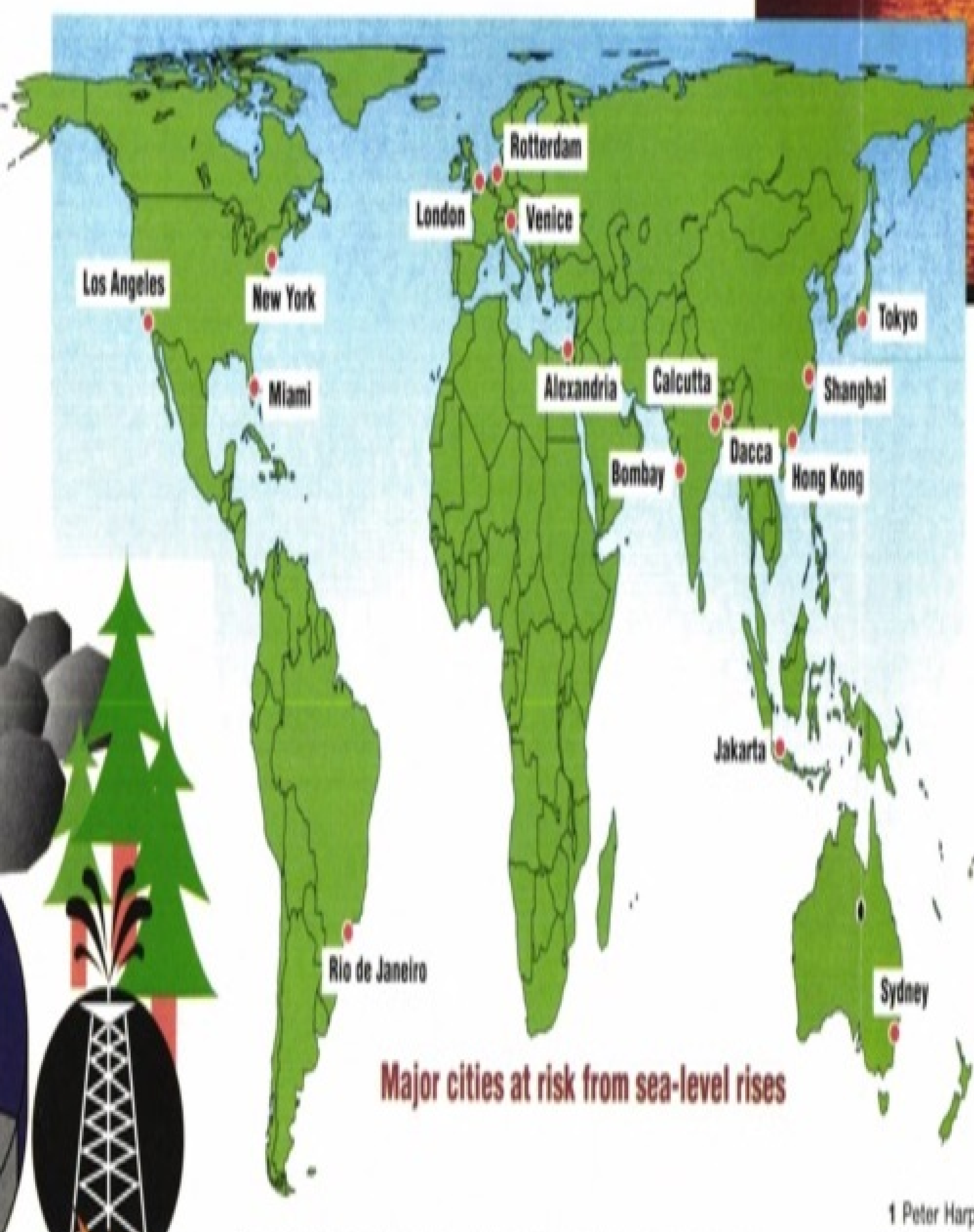
The world currently relies on fossil fuels – oil, coal and gas – for most of its energy[11]



- 🟦 Crude Oil
- ⬛ Coal
- 🟥 Natural Gas
- 🟨 Biomass
- 🟪 Hydropower
- 🟧 Nuclear energy
- 🟩 Geothermal, Wind, Solar

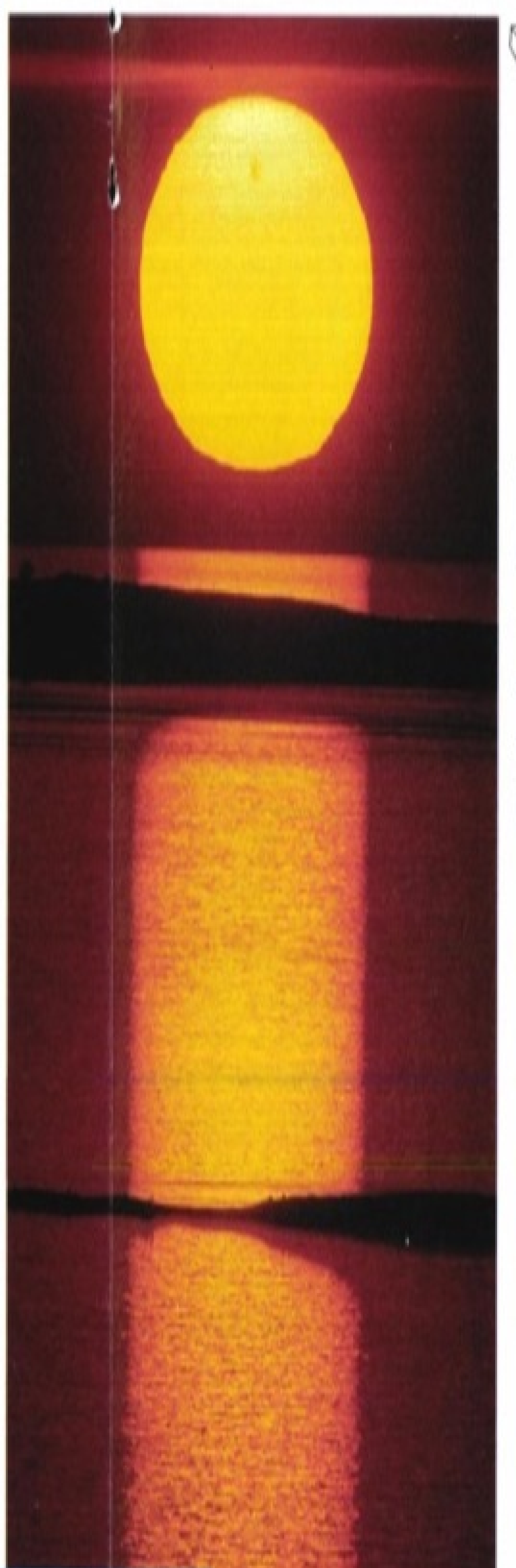
FOSSIL FIXATION

Fossil fuels – oil, coal and gas – currently provide the world with most of its energy. But burning these fuels is the primary source of carbon dioxide emissions, the main cause of global warming. At this rate the global temperature is set to rise 3-4 ºC by 2100, causing a rise in sea levels of 66 cms and the disruption of the world's climate. The low-lying Maldive islands, in the Indian Ocean, would disappear entirely.[5]



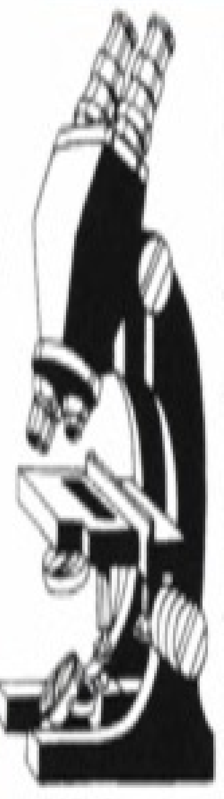
Major cities at risk from sea-level rises

In 1992, the Intergovernmental Panel on Climate Change concluded that a cut of 60-80% in human-generated emissions of carbon dioxide and other greenhouse gases is needed to stabilize the world's climate.[4]



PEKKA PARVIAINEN / SCIENCE PHOTO LIBRARY

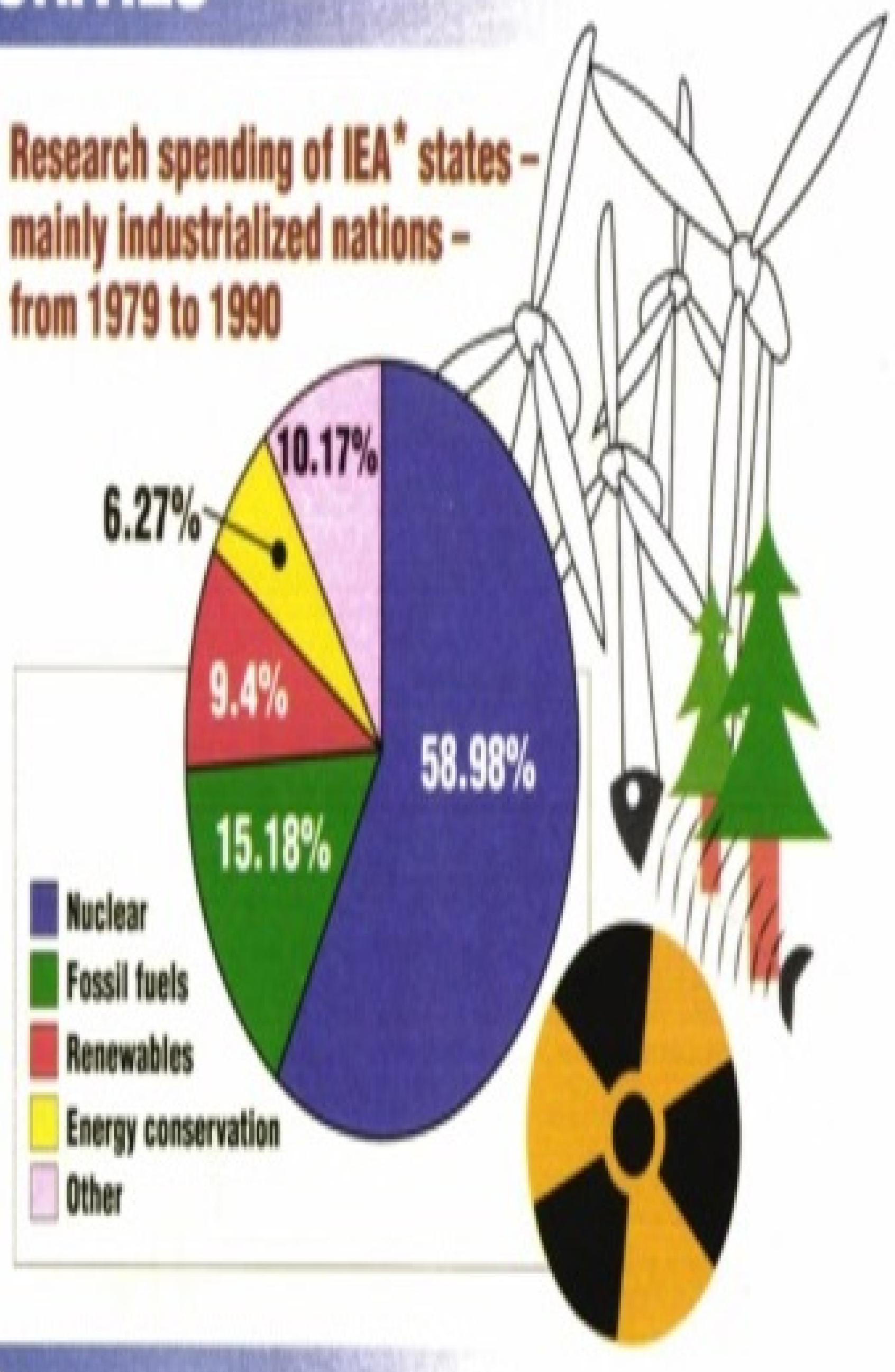
RESEARCH PRIORITIES



MOST RESEARCH AND DEVELOPMENT MONEY GOES TO FOSSIL FUEL AND NUCLEAR INSTEAD OF TO CLEAN, RENEWABLE TECHNOLOGIES. In 1990 the US Government spent less on solar technology development than the cost of one transport plane, a B-1B bomber or a single nuclear missile.[6]

*International Energy Agency

Research spending of IEA* states – mainly industrialized nations – from 1979 to 1990

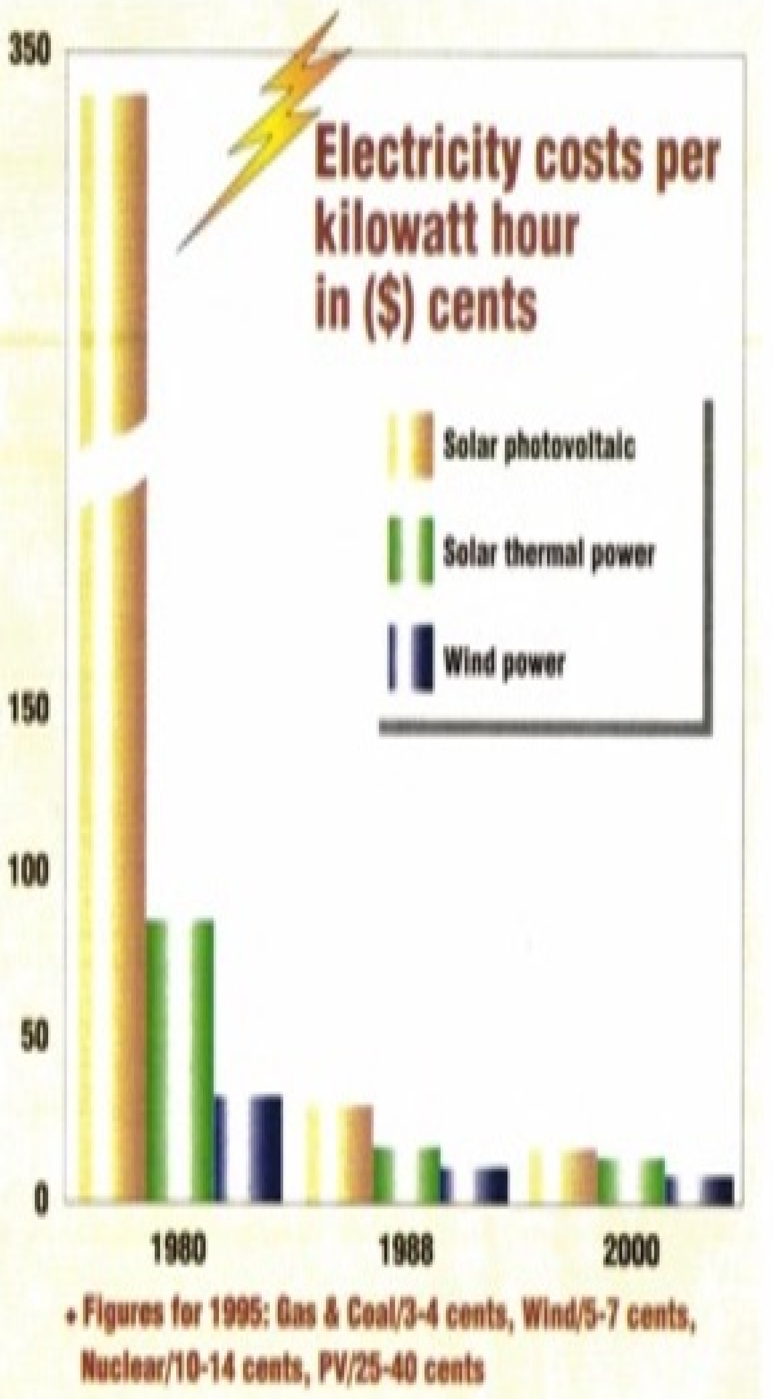


- 🟦 Nuclear
- 🟩 Fossil fuels
- 🟥 Renewables
- 🟨 Energy conservation
- 🟪 Other

THE ECONOMICS

THE COST OF DIFFERENT ENERGY SYSTEMS IS SKEWED IN FAVOUR OF FOSSIL FUELS AND NUCLEAR BY PAYING THEM HUGE SUBSIDIES.

◆ According to World Bank estimates, direct fossil fuel subsidies amounted to $220 billion worldwide in 1991. Solar and other renewable energy subsidies are virtually zero.[3]



◆ Figures for 1995: Gas & Coal/3-4 cents, Wind/5-7 cents, Nuclear/10-14 cents, PV/25-40 cents

CASCADING COSTS

One of the arguments against renewable energies is that they are uneconomic. But this is wearing thin as the price of electricity generated from renewable sources comes down and the technology becomes more efficient.

◆ In 1995 the cost of electricity generated from gas and coal was 3-4 cents per kilowatt hour, from nuclear was 10-14 cents, from wind was 5-7 cents, and from solar photovoltaic was 25-40 cents.

◆ But by 2030 wind, solar and biomass power may be cheaper than fossil fuels or nuclear.

RENEWABLE POTENTIAL

RENEWABLE ENERGIES HAVE A TREMENDOUS POTENTIAL WHICH IS BARELY BEING USED.

◆ WIND: Land-based turbines could provide 20,000 terawatt-hours of electricity per year – or twice as much as the world consumed in 1987.[8]

◆ BIOMASS: More than 50 Third World countries would be able to produce as much energy from the residues generated by sugar production as they use now via imported oil.[9]

◆ HYDRO: Less than 5% of the world's small-scale hydro power potential has been exploited so far.[10]

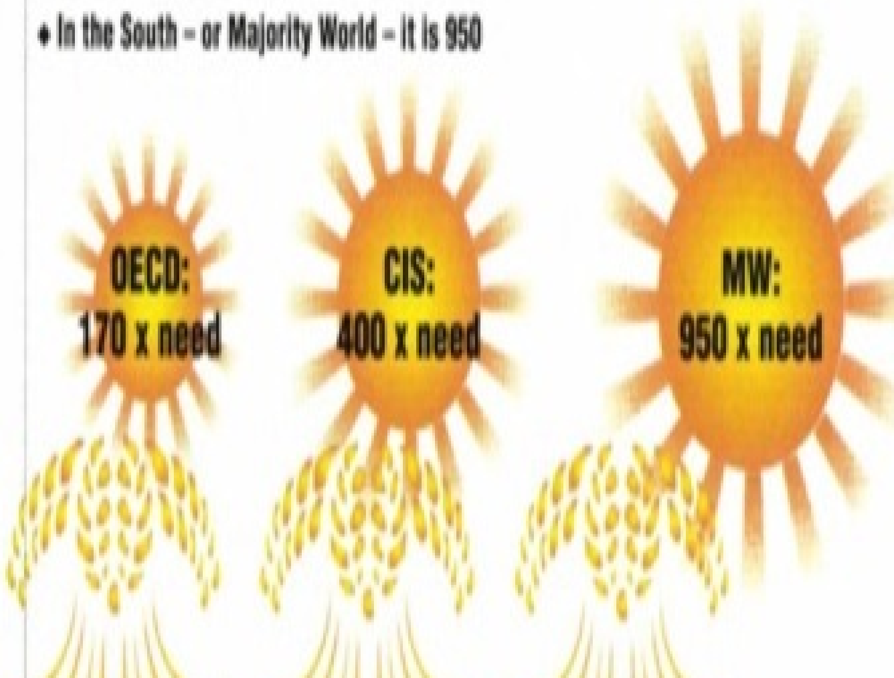
Solar harvest

The sun can produce at least 1,000 times more usable energy than we currently need

◆ In OECD – or Western industrialized countries – the usable solar harvest is 170 times more than needed

◆ In the CIS – former USSR countries – the ratio is 400

◆ In the South – or Majority World – it is 950



◆ If solar photovoltaics were deployed wholesale today in homes and offices, they could generate two-thirds of the UK's current production each year.[7]

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1 Peter Harper, *Renewable Energy and the Future*, paper 1996. 2 Understanding Global Issues, *Solar Power*, London, 1996. 3 Christopher Flavin, Nicholas Lenssen, *Power Surge*, Earthscan, London, 1995. 4 Greenpeace International, *Fossil Fuels in a Changing Climate*, Amsterdam, 1993. 5 United Nations Intergovernmental Panel on Climate Change. 6 Herman Scheer, *A Solar Manifesto*, James and James, London, 1994. 7 Greenpeace, *Unlocking the Power of our Cities*, London, 1995. 8 Proceedings of the European Wind Energy Conference in Amsterdam in 1992. 9 Cynthia Pollock Shea, *Renewable Energy: Today's Contribution, Tomorrow's Promise*, World Watch Paper 81, World Watch Institute, Washington DC, January 1988. 10 Godfrey Boyle, ed., *Renewable Energy: Power for a Sustainable Future*, Oxford University Press and the Open University, 1996. 11 Robert Hill, Phil O'Keefe and Colin Snape, *The Future of Energy Use*, Earthscan, London, 1995.

Here comes the sun... and the wind and the rain

A tour around the possible future... some passion from ***Claire***... but will it dent ***Gloria's*** scepticism?

UP A NARROW LANE they went until they reached The Quarry, a disused slate works, on a hill outside the small Welsh town of Machynllyth.

It was here that in the 1970s a handful of hippies and idealists tried to create an alternative way of living. They wanted an entirely self-sufficient community – and that meant devising their own energy systems.

'Have you been here before?' asked Gloria.

'Oh yes.' Claire's eyes misted over slightly.

A romantic connection, wondered Gloria? Or was it just that she was a romantic? 'And have you been back there recently?' she asked.

'Oh yes,' she replied in a more matter-of-fact voice.

'Has it changed much?'

'Yes. It's... um... matured. It's now a Centre for Alternative Technology, the foremost in Europe. About 80,000 people pass through a year, including lots of school groups. They run residential courses on eco-building or on how to generate your own power. There are eco-cabins where people can stay and a restaurant and shop...'

'And the politics?'

'Less purist. More pragmatic. There aren't the endless debates there used to be about whether one could use ready-made nails or whether one had to make one's own. They still run the place as a co-operative, though...'

The pace of life seemed to slow right down as they came up the hill. They walked through organic gardens, past the bee house, past a solar-powered telephone kiosk. 'Shall I call South Africa?!' Gloria was about to say but Claire had already marched ahead in the direction of a wind turbine, poking out above the trees.

'So,' said Gloria, catching up, 'what I want to know is if I had this in my backyard could it I run my house on it?'

'You'd have to have a good windsite, in the country probably.'

'And if I didn't... If I lived in a city or a suburb?'

'You might be better getting your power from a windfarm...'

'And where might I find one of those.'

'There are a few in this country. But California and Denmark are the places where windpower's really taken off. In California windfarms already supply the equivalent of all of San Francisco's domestic power needs. What they are doing in Denmark is really interesting. People get together in groups and buy a wind turbine or group of turbines which provides them with the electricity they need, and they sell off any surplus to the national grid. About half of Denmark's wind turbines are owned and operated in this way.'

'Mmm... But is it a real option as a main source of energy? Can wind power ever really produce enough energy to supply an industrialized nation, for example?'

'Well, it's reckoned that in Europe windpower could meet all the continent's electricity needs. The European Wind Energy Association's proposal is rather more modest. They reckon it would be quite feasible to meet ten per of cent of the European Union's needs by 2030 using turbines, and if you put them all together – not that you would – they would occupy an area about the size of Crete.'

'Ha! So they occupy land that could be used for agriculture...'

'And could still – 99 per cent of the land would still be available to agriculture around the windmills.' Touché, thought Claire, but managed to stop herself saying it.

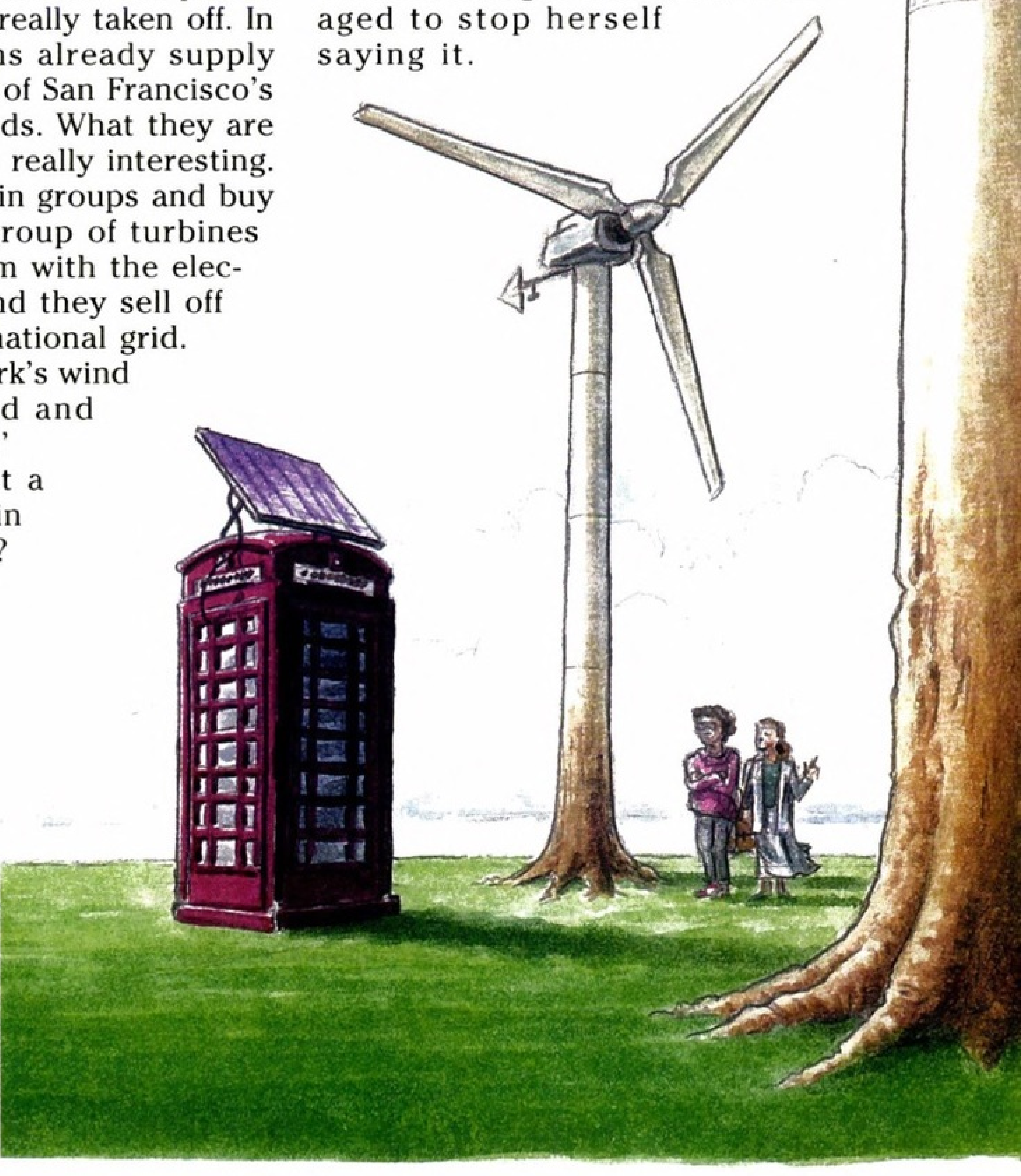


ILLUSTRATION: PJ POLYP

But just as she basked, Gloria was coming back with another point.

'One thing that seems to get missed out by you renewable energy people is employment. What about all the jobs that are going to be lost in the energy industry?'

'Well, I'm not sure about that,' Claire twitched. 'I mean, look at this European Wind Energy proposal. The manufacture of turbines will employ about 50,000 people and operation and maintenance of windpower will create another 100,000 rural jobs...'

'It's not like coal mining though...'

'It's something that will have to be addressed... I'm not sure how. But don't underestimate the new energy jobs that will be created by renewables – safer, healthier jobs too.'

'Some people would argue that an unsafe job is better than no job.'

They meandered on and came across a windpowered water pump, devised by Dulas, a local alternative engineering company, for a group of Eritreans who visited the Centre in the 1980s.

'This system has really taken off in Africa. It's good for irrigation.'

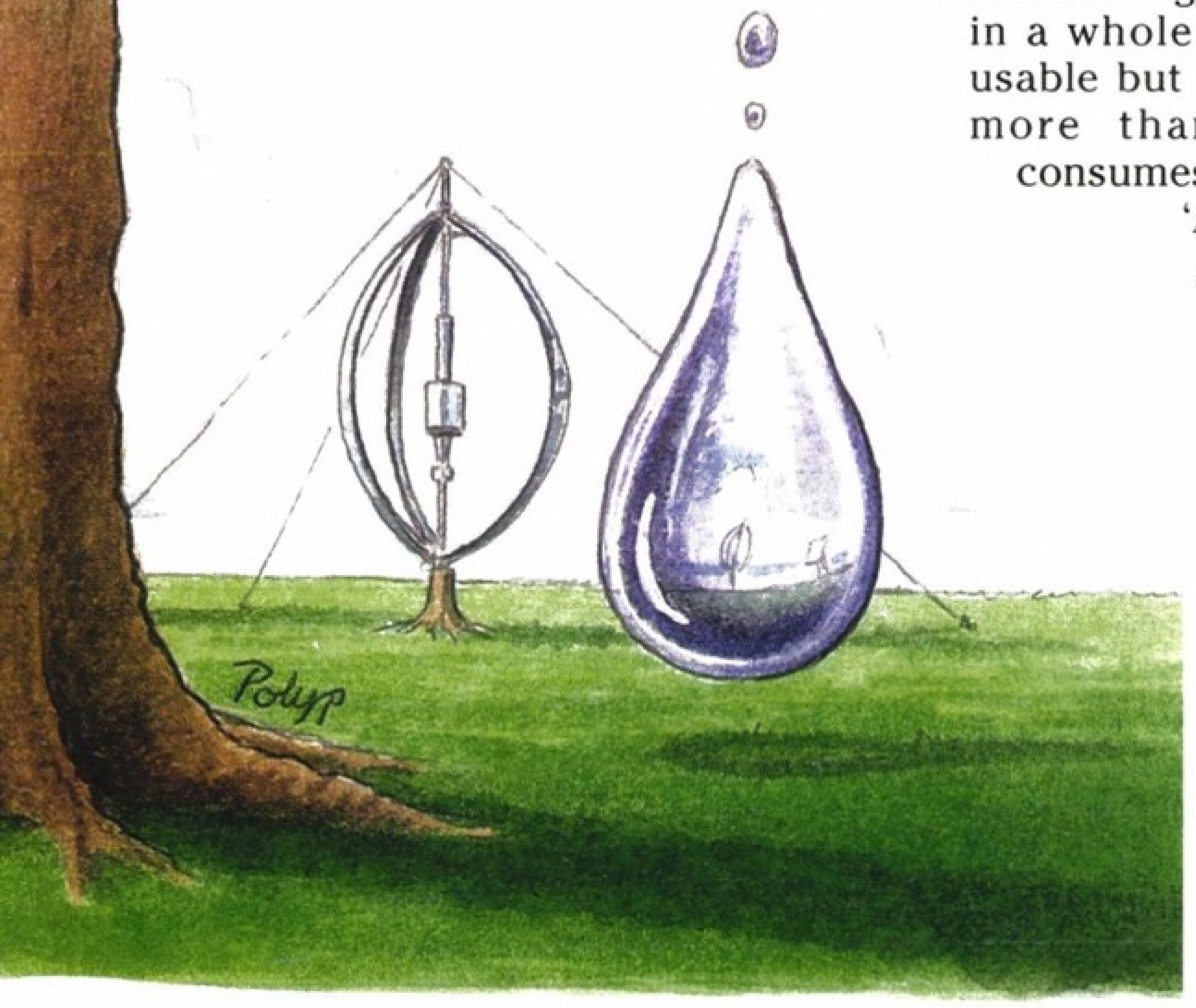
Gloria nodded, now looking at a water turbine powered by a nearby lake. 'So what's the power source being used in this Centre, then?'

'Everything you see. Let's go to the power house, I'll show you how it works.'

They walked past a biomass woodchip burner and came to a big board on which all the energy systems were displayed: there was micro-hydro, windpower, solar, biomass, diesel...

'Diesel!' shouted Gloria. 'But that's sacrilege!' She looked aghast.

Claire couldn't help laughing. 'Yes, fossil fuels come on as a stop-gap. And actually I think it's okay to use a little, in a limited way. '



'Huh!'

Claire explained the series of computerized trips and switches in the power house, how the most productive source of power was automatically selected to come on stream depending on the weather or water level conditions.

'So in your renewable future are we all expected to have a great power house in our backyards and half a dozen different energy systems..?'

'No. This is not a model to be repeated on this scale. It just demonstrates the different energy options available on a far larger scale.'

'Mmm... And what's this about solar? Where's that?'

Claire led her to the solar installation. 'Now there is one unfortunate thing about this installation,' said Claire once they reached the panels. 'It is built in what is probably the least sunny spot in Europe! But anyway, it seems to be producing power today.'

'How can you tell?'

Claire showed her a miniature fairground roundabout being driven by power from the panels.

'Sweet,' commented Gloria, 'but it's hardly going to power a steel plant.'

'No, for that you need a big installation in an area that gets lots of direct sunlight, like they have in the Mojave desert in California or in Israel.'

Gloria looked at the clouds passing across the sky, reflected in the panels.

'You know I'm not at all convinced by solar power. I don't think it's got the potential...'

'Potential!' Claire exploded. 'It has enormous potential... it has greater potential than anything else! Just a quarter of an hour of sunlight offers more energy than humanity consumes in a whole year! Now not all that is usable but what is is still 1,000 times more than the world currently consumes...'

'And how much of our energy comes from solar power at the moment?'

'Just 0.001 per cent'

'What? If solar is so great why isn't everyone using it?'

'The simple answer is it's still much more expensive to generate electricity from solar than from conventional systems. And the reason for that is that the funding for research and development has been pathetic. While fossil fuels get huge amounts of research and development money, solar gets peanuts.'

She fumbled in her bag. 'I've got some figures somewhere. It really beggars belief. Ah, here! Do you know that the US spent less on solar research in a year than it costs to buy just one fighter plane? Worldwide more than $200 billion is spent on direct subsidies to fossil fuels to help keep the prices down. Solar gets nothing! No wonder fossil fuels appear cheaper. But it's a false economy. We are just paying for them out of another pocket. Not to mention the environmental price!'

Claire was well away by now: 'The whole world's energy system is skewed in favour of the fossil fuels and the multinationals that control them. It's scandalous really. What's amazing is how much solar research has achieved with so little help. It's got much more efficient and the price of photovoltaic panels has gone down tenfold in the past 20 years!'

Gloria was somewhat quietened by Claire's passionate outburst. They both sat looking at the panels. Gloria went over to them and read what was written there.

If you were asked to design the ideal energy conversion system it would be pretty difficult to come up with anything better than the solar photovoltaic cell. It harnesses the energy source that is by far the most abundant of those available on the planet. It's clean – very small amounts of toxic chemicals are used in the manufacture of cells, but that's all; there are no emissions. The photovoltaic cell itself is made from the second most abundant element after oxygen in the earth's crust – silicon. It has no moving parts and cannot therefore, in theory, wear out. And its output is electricity, probably the most useful of all forms of energy.

She then looked at charts showing the decline in price. The average market price of PV cells plunged dramatically from $30 in 1975 to around $3.5 per peak watt hour now. In a few years time, analysts reckoned, it would be no more expensive than electricity produced by nuclear power.

'I suppose the technology is controlled by the North,' Gloria remarked to Claire who had come up alongside her.

'At the moment most cells are being made in the US, Japan, Germany and France, but Brazil, China, India and Pakistan have started making their own. What tends to happen is that countries start by importing modules to assemble themselves – they are doing that in parts of Africa now – and then move on to actually making the cells themselves.'

When they got back to their Bed & Breakfast Claire eagerly presented Gloria with another stack of papers. 'I thought you might like...'

'What, more reading matter!'

'Well... of course you don't have to...' muttered Claire, feeling suddenly embarrassed by her own evangelism.

But Gloria was already taking the bundle from her. 'We'll see. If those moaning eco-friendly windmills keep me awake all night I might welcome something to read...'

That night Gloria was not kept awake by windmills, but she read all the same. First she picked up a newspaper clipping:

> **SCHEER'S REVOLUTION**
>
> 'I have no doubt that the day will come when the only energy used on this earth will be solar,' says Hermann Scheer, the charismatic German former Energy Minister and founder of the pressure group Eurosolar.
>
> He is calling for a 'Solar Revolution' with the replacement of all nuclear and fossil fuels within the next four decades. 'Only a fully solar global energy economy can preserve the ecosphere,' he maintains.
>
> Scheer wants an international 'solar proliferation treaty' that will bring us into the Solar Age and break the reactionary stranglehold of vested interests, both corporate and government. And his views are rapidly gaining ground in his native Germany.
>
> The main opposition SPD party has said that an ecological economy based on renewable energies will be the main plank of its policy.
>
> Scheer, who is the SPD spokesperson on Agriculture and the Environment, has introduced a Solar Initiative Bill in the German Parliament designed to finance the conversion of 100,000 roofs to photovoltaics. This would mark the beginning of a whole new industry and employ 30,000 people...'

GLORIA PICKED UP Scheer's book *A Solar Manifesto.* She read his scathing critique of the small-mindedness of the decision-making élites who slashed research on renewable energy the moment oil prices went down in the 1980s. In the US the 1990 research and development budget for renewables was a mere 12 per cent of the 1981 budget. In Canada it fell to 16 per cent, in the UK to 50 per cent and in Australia and Aotearoa/ New Zealand it dwindled to almost nothing.

Scheer wrote:

> '...it is obvious that support for solar energy was kept deliberately small, even though it is the newest and most wide-reaching area of publicly supported energy research... Disinformation was spread about the efficiency of solar energy technologies and positive results were downplayed... As this has been happening in virtually all countries, it leads one to conclude that this is due to a colluding international opinion Mafia.'

Easy power: maintaining solar panels in Sudan involves the occasional dusting down.

HARTMUT SCHWARZBACH / STILL PICTURES

GLORIA WONDERED how much she had been influenced by the 'colluding international opinion Mafia'.

She picked up another book, entitled *The Hydrogen Solar Future* by John O'M Bockris and T Nejat Veziroglu, Professor of Chemistry at Texas A&M University, and Director of the Clean Energy Research Institute in Miami, respectively. The subtitle was: *The power to save the earth. Fuel forever.*

'Well, they can't be accused of underselling their own theory,' she remarked. But she found it intriguing all the same:

> **SOLAR HYDROGEN COUPLING**
>
> 'The solar energy scheme we are putting forward here is sometimes called the solar-hydrogen energy system. Put simply, solar energy is converted to electricity; to get the electricity over long distances or for use at night the electricity is used to electrolyze water to produce hydrogen... The hydrogen is sent through pipelines, just as natural gas is today, to cities and towns.
>
> The benefit of this system is that by putting excess electricity to work by producing hydrogen, it is not wasted. In addition it is cheaper and more efficient to transport through pipelines than to send the excess electricity over wires and through cables. Finally, and most beneficial of all, hydrogen and solar energy do not pollute: when hydrogen is used to supply heat or energy, water is the by-product.
>
> Our solar energy will be around for a few billion more years – it is everlasting as far as we are concerned – and we would obtain hydrogen from water, and that won't run out either as water is the by-product of burning hydrogen. Thus solar hydrogen is a clean and renewable system.
>
> So many of the natural processes on our planet are self-sustaining – the circulatory systems of animals and humans, the respiratory system of animals, humans and plants, the food chain, and the earth's water cycle. Doesn't it make sense that our energy should be derived from a renewable system too?'

'NEAT,' SHE THOUGHT. 'And convincing.' She closed her eyes and tried to imagine how a renewable energy future would look. Would there be huge solar power installations in the Sahara or massive windfarms covering hillsides or stretched along coastlines. Or would it be each individual household with its own system?

She picked out a personal testimony from a young North American woman called **Sara Chamberlain**:

OFF THE GRID

We moved to Northern California in 1976, when I was eight. My parents' idealistic plan was to build a cabin in the woods and live self-sufficiently off the land. Although they soon realized that it was cheaper to buy lentils than grow them, they managed to make their dream of a solar and hydro energy-powered house a reality – and said goodbye to electricity bills forever.

Our solar power system developed thanks to the experiments of our landpartner, John Harnish. In 1980 he discovered Real Goods: a small local store that sold a variety of solar panels and alternative energy equipment, which today is one of the largest alternative power hardware retailers in North America.

Initially John bought one solar panel, capable of producing approximately 30 watts of power per hour of sunlight, for $260. He also bought two 12-volt golf-cart batteries (for $60 each) to store the power generated by the solar panels, and 12 feet of household electrical wire to link them together.

He hung the solar panel on the sunny side of his house, using a few nails, connected the batteries and ran some wires into the house. Now he could plug in three 15-watt halogen bulbs (which give off three times as much light as regular bulbs) for six hours a night. That night, as the stars of the Big Dipper came out one by one above the oak trees, John read the *Tao of Physics* by the bright light of an electric lamp.

My parents followed suit. They bought one 30-watt solar panel for $260, and one 70-watt panel for $385, and six golf-cart batteries for $360. Seventeen years later, this $1,110 solar system still faithfully powers 12 lights, a blender, fan, and answering machine; and allows my 69-year-old father and 64-year-old mother to surf the Internet on their computer and download information on their printer. Satisfied with these basic amenities, my parents haven't ever needed to expand their solar system.

However, 1979 brought a succession of monsoon-style storms. Weeks of non-stop rain climaxed in a snowstorm. The panels stopped functioning, we drained the batteries dead, and were forced to re-light our kerosene lamps. Attempting to decipher *A Tale of Two Cities* in semi-darkness, we realized we needed a winter-weather alternative.

Holland plans to install solar panels on 100,000 homes by 2010 and Japan has plans for 70,000 by 2005. The UK agreed to help fund a grand total of two houses.

MIKE SCHRODER / STILL PICTURES

John came to our rescue. Over the years he had struck up a friendship with a man called Ross Burkhart, who had invented one of the first micro-hydro energy systems, the 'Burkhart pelton wheel'. When the wheel was put in a box, and water fed through it, the wheel would spin around turning a shaft which powered an alternator and generated electricity. All it needed was water that dropped at least 200 feet before entering the box.

John bought one of Ross's pelton wheels, some piping, wire and batteries, and rigged it up at the edge of a nearby creek. The Burkhart pelton wheel, which can now be purchased from Real Goods for $265, produces 1,000 to 10,000 watts of power per day during the winter, which is more than enough electricity to satisfy even the most power-hungry....

Today, come rain or shine, my parents can read the *New York Times* on the Internet, and John's eight-year-old son Bodhi can play computer games without ever having had to connect to the grid.

'CRAZY AMERICANS,' Gloria concluded. Though she had to admit they did make things sound so easy...

She thought of the remote rural communities in South Africa, desperate to link up to the National Grid, as though this were the be-all and end-all. She also knew in her heart of hearts that they would have to wait a very long time, and in the meantime they could be generating their own power.

She picked out another piece, also about inventive ways of adapting to change in rural North America. This article was written by Canadian **Stephen Leahy**:

With cuts to income-support programs and the increasing globalization of agriculture, North American farmers are looking to their past to find ways to survive in the future. Often forming new co-operative enterprises, farmers are turning waste straw into building materials, corn into fuel, wheat starch into plastics, soybeans into inks and milk into paints and glues.

Farmers are also growing non-traditional crops like kenaf to make paper, milkweed to replace goose down in pillows and, now that it is legal in Canada, hemp. The strong, breathable fibre of the non-narcotic hemp plant has hundreds of uses from jeans to linens. When the full environmental cost of using petrochemicals is considered, it's clear the next century belongs to living plants, not long-dead ones.

GLORIA LIKED THAT idea. It made her think about possible building materials for South Africa's housing program. Traditional adobe or mud was in many ways the best material, but it was considered insufficiently 'modern'. She'd enjoy telling people back home that North Americans were building houses with straw stubble!

The idea of renewables was growing on her.

'Maybe that place has had an effect on me,' she mused as she was dropping off to sleep and recalling the quietly inventive atmosphere of the Centre. Meanwhile in the next room Claire was lying awake thinking: 'Oh my God, why is she so resistant? I really wasn't prepared for such scepticism. I doubt my thinking has had any impact on her whatsoever. She obviously thinks I'm just some wet, white, greenie liberal. Oh well... only a couple more days to go...' ■

SIMPLY – Energy

No single energy system is perfect. But some are a good deal better than others. Future energy use is likely to consist of a mix-and-match approach – ideally, phasing out conventional sources and bringing in a range of non-polluting renewable options.

pushing
plan
HELLO
ENERGY
MOO
STORAGE
wood
plants
CLAY

MICRO-HYDRO

Small-scale systems tap the energy of flowing water. These are not to be confused with big dam projects which totally transform ecosystems, wreaking environmental havoc.

▲ UPSIDE

✓ Very simple, cheap technology
✓ Clean, non-polluting
✓ Suitable for remote and hilly regions
✓ Produces cheap electricity
✓ Safe

▼ DOWNSIDE

✗ Needs a sharp drop and regular, flowing water
✗ Needs to be small scale not to damage the environment

WINDPOWER

An ancient source undergoing a revival with modern turbine technology.

▲ UPSIDE

✓ Clean, non-polluting
✓ Plentiful, renewable supply
✓ Suitable for less sunny regions
✓ Dovetails well with other systems
✓ Simple technology
✓ Produces cheap electricity
✓ Safe if properly maintained

▼ DOWNSIDE

✗ Aesthetically intrusive
✗ Windfarms make noise in quiet places

BIOMASS

Biomass is vegetal or organic material – including dung and plants – and biofuels are the solid or liquid or gaseous fuels that derive from it. Wood, methane and alcohol are all biofuels.

▲ UPSIDE

✓ Cheap, renewable
✓ Ideal for rural communities
✓ Recycles waste, including sewage
✓ Fertilizer as by-product
✓ Biofuels are less polluting fossil fuel alternatives

▼ DOWNSIDE

✗ Specially-grown agricultural biomass could compete for land with other crops
✗ Reliance on woodfuel contributes to deforestation
✗ Some pollution from burning biofuels but no more carbon dioxide than would have been produced anyway by natural processes

WALL FIXABLE
heat
volcano
NUCLEAR POWER STATION
deep water
binoculars
oil rig

GEOTHERMAL

This energy comes from the heat stored in rock below the earth's surface. The heat is 'mined' by drilling a bore hole and used to generate electricity or to heat water.

▲ UPSIDE

✓ Relatively clean, non-polluting
✓ Safe and inexhaustible
✓ Cost effective and growing fast
✓ Suitable sites exist in many parts of the world

▼ DOWNSIDE

✗ Drilling is noisy and disposal of drilling fluids requires large lagoons
✗ Produces small amounts of carbonate, chloride and sulphide pollution

SOLAR

The sun's power can be harnessed in various ways: by using photovoltaic cells to generate electricity directly; by using thermal collectors to make steam to generate electricity; by using passive solar materials that maximize or retain the sun's heat.

▲ UPSIDE

✓ Clean, non-polluting
✓ Renewable, endless supply that belongs to no-one
✓ Operates best in the sunniest – often the poorest – parts of the world
✓ Dovetails with other clean systems, eg windpower, hydrogen
✓ Flexible and modular – means systems can be any size
✓ Safe

▼ DOWNSIDE

✗ Research and development underfunded
✗ Electricity produced is more expensive
✗ Cannot be used as the only system in cloudy places
✗ Energy has to be stored in batteries, hydrogen, water or other matter

NUCLEAR ENERGY

Currently produced by 'fission'. An atom is split – using uranium – and the heat produced drives steam turbines to generate electricity.

▲ UPSIDE

✓ Massive investment already committed
✓ Does not cause global warming or air pollution

▼ DOWNSIDE

✗ Nuclear accidents and radiation leaks cause cancers and other fatal disorders.
✗ Legacy of radioactive waste that remains 'live' for 50-100 years
✗ Decommissioning old power stations very costly
✗ Expensive way of generating electricity

TIDAL POWER

Tidal energy is harnessed by building a barrage across an estuary. At high tide the barrage traps a head of water which is released at low tide to drive turbine electricity generators.

▲ UPSIDE

✓ Produces cheap power
✓ Clean, renewable, safe
✓ Low running costs
✓ Water behind a barrage is clear and more biologically productive
✓ Barrages protect against floods and storms
✓ Lots of potential worldwide

▼ DOWNSIDE

✗ Set-up costs are high
✗ Tidal power comes, usually, in two daily bursts
✗ Tidal barrages have to be carefully situated to be efficient
✗ Large barrages affect estuary ecosystem

FOSSIL FUELS

Derived from long-dead organic and animal matter. Oil, coal, natural gas are all fossil fuels.

▲ UPSIDE

✓ World economy geared to fossil fuels
✓ They are practical

▼ DOWNSIDE

✗ All produce greenhouse gases that cause global warming
✗ Oil produces toxic fumes causing air pollution, asthma and brain damage
✗ Coal produces acid rain, air pollution and acute respiratory diseases

Sources: *The Future of Energy Use* by Robert Hill et al, Earthscan, London 1996. *Renewable Energy: Power for a Sustainable Future* ed. Godfrey Boyle, OUP/Open University, 1996.

ILLUSTRATION: KARL DUKE

Real values

Politics, ethics and the future of the world. That' s all! The debate draws to its conclusion – for the time being.

THERE WAS A GENEROUS breakfast to be had at Mrs Jones' lodgings.

'I'm all for renewable energy,' Gloria began, munching on a piece of toast.

Claire's jaw dropped.

'...but you know what will happen. As soon as the multinationals get in on it, they buy up patents and either sit on them for years or else run the show for their own profit...'

'Funny, I was just reading a report from a solar conference where they were worried about 'top down' domination of the solar power agenda by corporations who get the lion's share of what little development funding there is...'

'Well, what can be done to stop it?'

'Overthrow capitalism?'

'Ha! A very realistic option these days!'

'But seriously, I think the nature of the technology works in our favour... '

'How's that?'

'Renewable energy systems tend to be modular. Take solar panels. You can have just a very small one or add on according to your needs. The same with wind turbines. So it's easy for a group or a small community to own the means of generating power. A lot more feasible than owning a coal field or a nuclear power station.'

'But look at who is making solar panels. BP, Amoco, Enron – all big fossil fuel giants.'

'And others... there are scores of smaller companies. The corporations don't have a monopoly on the technology. Companies in Third World countries are already making solar systems...'

'Until they get swallowed up by the big fish...'

'Or not. Solar installations can be produced on a relatively small scale. And anyone can make a wind turbine or a water wheel. That's just basic engineering.'

'So what are you saying?' challenged Gloria. 'Renewable technology is "politically okay" and conventional systems aren't?'

'Renewable technologies lend themselves more easily to democratic, decentralized, self-reliant applications than conventional ones; they are by their nature less easy to control by a single powerful group. In fact, they're the polar opposite of the nuclear industry and the military industrial complex.'

'So it's okay. We needn't worry...?'

'There is always the danger that multinationals will run the show,' Claire conceded. 'I'd far prefer it if people made their own renewable systems locally to meet their own needs. But if it's a choice between the corporations going renewable or sticking to their old polluting ways and blocking change...'

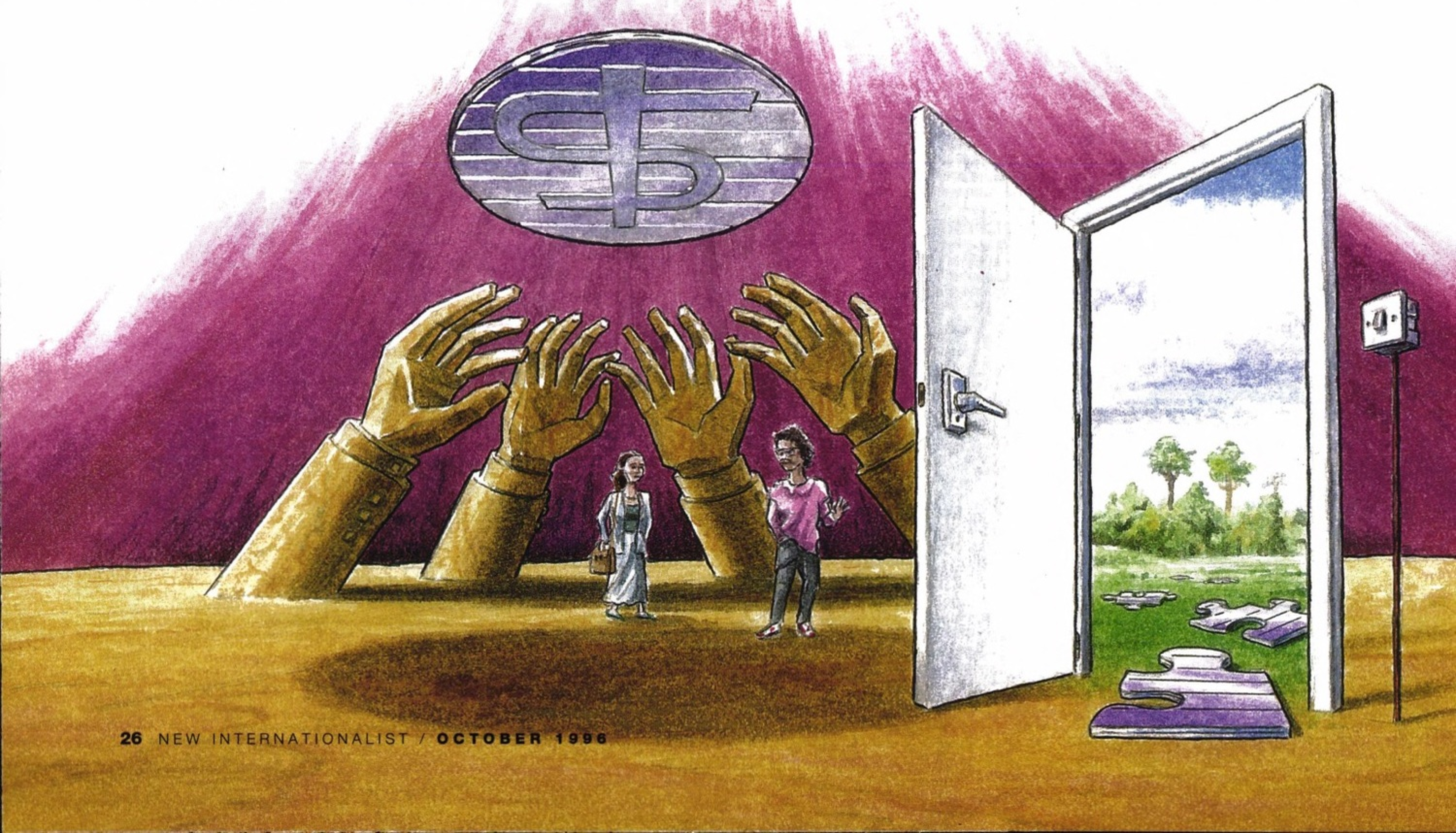
'But aren't they effectively blocking change, anyway?' Gloria was really getting going now. 'Their investment and profit is in fossil fuels. They're going to hang on to them to the death! Even while they are making nice noises about renewable energy. Doing the odd little project here and there that looks good as a publicity exercise... And you lot are conned into thinking: "Oh great they are taking up our ideas!" '

'It's true that they do block change. But they tend to do it less by buying up and shelving inventions; more by being very slow at moving to mass production. They only act when they have to, under pressure from consumers and legislators. That's why it's so important to put pressure on governments to put environmental pressure on industry.'

'Ah, so you rest your hope in governments!'

'In public pressure to bring about

ILLUSTRATION: PJ POLYP



political change. Politicians rarely lead, they follow public opinion – or are dragged along, rather.'

'And you see that happening?'

'Well, yes. In bits and pieces. Slowly.'

'And vast amounts of public money are being shifted to renewables?'

'A bit of World Bank money... Some overseas development agency money. Some Asian Development Bank money, but still pitifully little. So a lot of the funding for development of renewables is down to the private sector. In northern India, for example, a huge solar installation in the Thar desert is being built by... Let me see. I've got something on this...'

Claire pulled out a copy of *Down to Earth*. 'This is a very good science and environment journal out of India, by the way. Here it is...'

> In March 1996 the solar joint venture of Amoco (the US oil company with $28 billion annual sales) and Enron (a large US gas company) announced a 25-year 'power purchase agreement' to supply India with up to 50 MW of electricity from a new PV power plant to be built in the Thar Desert of Rajasthan.

'And that's supposed to be a good thing!? Sounds like good old-fashioned energy imperialism to me.'

'I agree. But if they weren't doing that they would be building a fossil fuel or nuclear plant.'

'Political idealism around renewables RIP!' snorted Gloria.

'I used to believe that an energy revolution could lead to revolutionary social change,' Claire responded. 'I now think it can really help bring about important social changes, but only in conjunction with other political changes and social movements. And with international collaboration. The North absolutely must do all it can to encourage the South to use renewable energy or we are all going to go under as the South industrializes!'

'Hang on a minute. Shouldn't you be doing it first?'

'In terms of the future global environment, the North isn't the major issue. It's in the South where the action is going to be. And there is so much we can do to disseminate clean technology in the Third World. Charities and development agencies could be much more involved in this.'

'Funny you should mention that, because in the stuff you gave me last night there was this rather interesting article,' said Gloria taking it out of a stack, balanced precariously on the table's edge. It was by **Mark Hankins**, writing from Kenya.

Southern Realities and top-down marketing of the solar cooker

> 'In the North it looks good on paper. It has all the right buzz words. It saves trees (environment), it's cheap (poverty alleviation), it prevents women from having to travel 20-odd kilometres to fetch wood (gender), it makes use of a renewable resource and it improves the taste of food (nutrition). It's the solar cooker, and yes, if the sun is shining it does work, and all of the above could be true. The problem is, African women haven't been quick to take up the technology!'
>
> What sounds like a wonderful idea for Africa in the North does not necessarily turn out to be so wonderful or easy to accomplish on the ground. If Northern armchair agendas by-pass Southern community priorities in promoting their eco-friendly technologies, ethical conflict is inevitable. Recent misguided attempts to promote solar cookers in Africa provide a glaring example.

'HE'S JUST ANTI-SOLAR,' Claire commented.

'Read on.'

> For the record, this is not a tirade against solar cookers. I work for an Africa-based organization that promotes solar energy, and I believe these solar cookers have their place here. But for any technology to work, there has to be strong local demand and the dissemination must be carried out by local people as part of their work. A concept originating from the North has little chance of succeeding if it is not firmly rooted in the community.
>
> In 1995, our organization was asked to evaluate several solar cooker programs in Kenya. Over six weeks we interviewed 50 families in various parts of Kenya that had received solar cookers. We found that only a handful of the cookers (six of the fifty) were being regularly used. Meanwhile local and Western project organizers were happily propping up under-evaluated and often unsuccessful programs. Moreover, most sent their Northern donors photos of smiling women using solar cookers in the villages and reported success in the number of cookers disseminated.
>
> In the fields, one thing was happening – women were politely thanking the benefactors for solar cookers and then putting them under their beds. In the West, something else was going on but only in the minds of ambitiously idealistic Westerners...

'I REALLY DO GET annoyed by this idealism-knocking...' Claire was quite piqued. 'Somebody has to have ideals and ambitions...'

> There are real, down-to-earth problems with solar cookers. Most people prefer to cook inside their homes, at times when the sun is not shining, and their cooking habits have developed around traditional methods, what they know best and are used to.
>
> The issue here is a style of development that takes a 'good' idea that's not accepted in the North and transplants it to the South in the hope that Southerners will be more receptive.

'THIS IS VERY DEFEATIST. You have to try,' Claire persisted.

'Listen,' Gloria insisted. 'I work for a Southern NGO and I see how much damage top-down development does. And it gives a bad name to what's being promoted. It's no good going in there with all your gizmos if you don't know intimately the priorities of the people who are supposed to use them. Anything else is... just ignorant and patronizing.'

Claire blushed, grew quiet.

She was still uncharacteristically silent as they walked to the Centre for Alternative Technology. Then she stopped in her tracks and, looking Gloria in the eye, asked: 'Do you think I'm ignorant and patronizing?'

Gloria smiled awkwardly. Claire's face had gone quite red and she looked almost tearful. 'Um... I wouldn't exactly say... but I think you do get a bit carried away with the wonders of the technology... I think it would be a good idea if you came to South Africa. I'd really like to show you around... I'm not saying it would make you change your mind. But it would give you another perspective... Give you a fuller understanding of the problems, the obstacles...'

Claire suddenly felt very grateful to Gloria for her honest but gentle treatment.

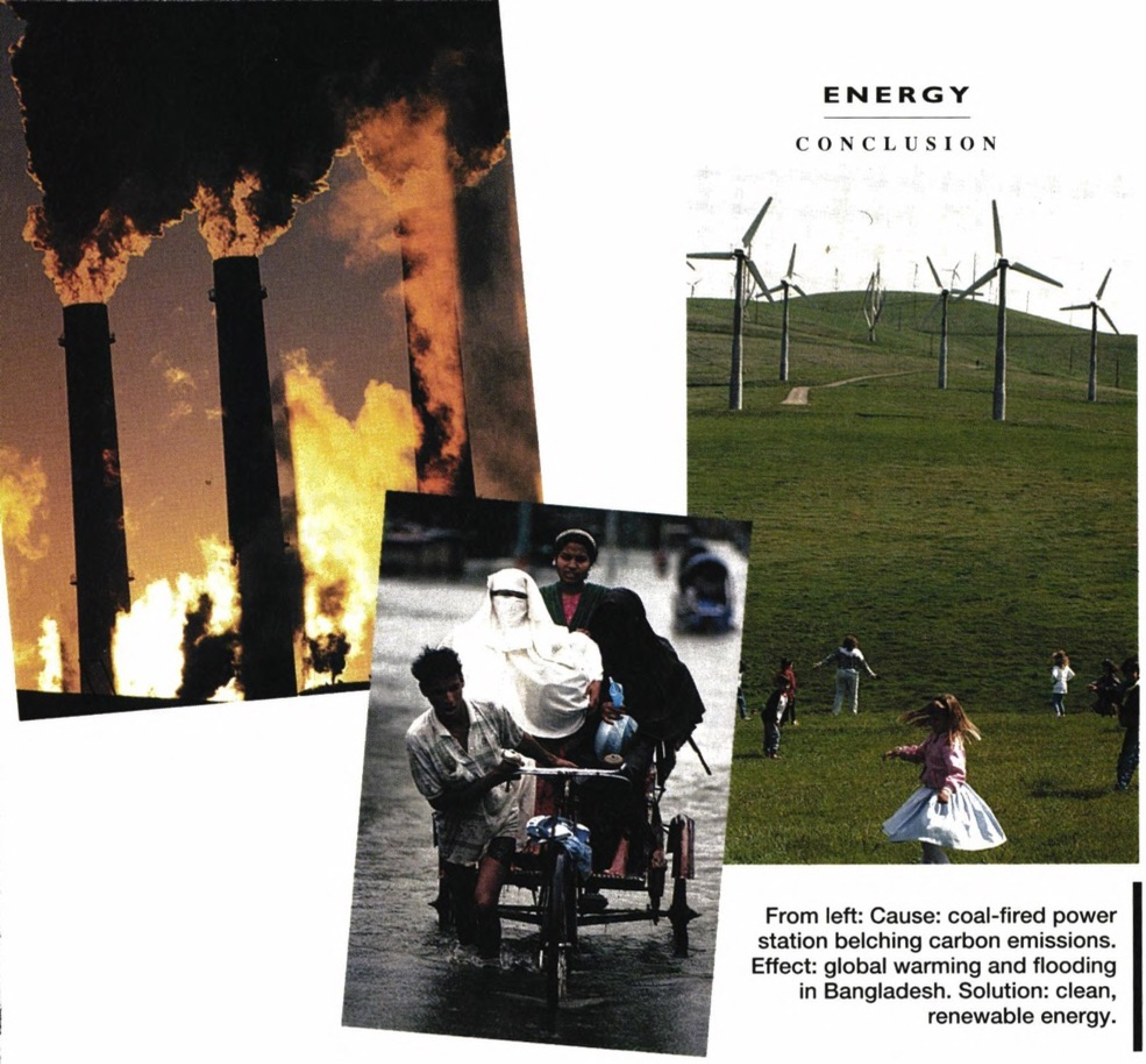
'Yes, I'd like to come.'

They entered the Centre for Alternative Technology's resource centre.

Gloria picked up a paper by **Peter Harper** and read:

WHY I HATE WINDFARMS AND THINK THERE SHOULD BE MORE OF THEM...

> 'I detest windfarms. I live in a hilly part of the country where the scenery is particularly varied and to my eye the ancient



From left: Cause: coal-fired power station belching carbon emissions. Effect: global warming and flooding in Bangladesh. Solution: clean, renewable energy.

LEFT TO RIGHT: KLAUS ANDREWS / STILL PICTURES; GIL MOTI / STILL PICTURES; DAVID HOFFMAN / STILL PICTURES

skylines are utterly spoiled by this kind of industrial machinery. To replace a conventional power station you need an awful lot of windmills, about 10,000 of them, and whatever you do you can't hide them. They need to be out there on the windiest spots.

Close up the noise is not loud but unnatural and particularly disturbing. And they need more pylons and transmission lines to get the electricity distributed. What more can I say? They are just awful.

Yet I support wind power on ethical grounds.

More than 90 per cent of our energy comes from fossil fuels. In essence every time you use fossil energy you are dumping your waste carbon dioxide into the global atmosphere.

You are collecting the benefits here and now, but passing on the costs to everyone else. 'Everyone' includes other human beings of course, but also other species, and indeed other generations that will have to cope in the future. The cost, the risk, of fossils fuels and nuclear, is to the environment and human health, and it's often irreversible. With renewables, on the whole, the impacts are aesthetic and cultural. I regard that as much softer. If we are faced with a choice of sacrificing nature values, human-health values or aesthetic values, the presumption must be against aesthetic values. I don't like that windmill on the hill. But if the alternative is flooding in Bangladesh, for God's sake let's have the windmills. And you can always take them down!

That is one guideline. The other is: if you ever have the chance to pay environmental costs up front you should take it.

With renewables the costs are congruent with the benefits. The community that gets the benefits pays the costs – so it's dead honest.

With fossil fuels it's the other way round. You get the benefits and someone else pays. Fossil fuels are intrinsically unjust and unfair. Renewables are intrinsically fair, with the exception, of course, of big dam projects which have the problems of conventional power.

As I gaze upon windmills it dawns on me that I am paying the bill. Ethically the only way I could argue against windpower would be to use so little energy myself that I didn't need to buy any, ever.

'I LIKE THAT,' Gloria remarked.

'Yes, it's a good one isn't it?' Claire had recovered her spirits by now.

'OK. So what needs to be done to get from where we are now to a fair and sustainable energy future? Five points please!' Gloria challenged.

The cogs of Claire's brain almost audibly began to whir.

'One, develop renewables. Fund properly their applied research. Take research funding out of fossil fuels and nuclear and shift the money across to renewables. Apply new renewable technological developments in the North and share them with the South. Enter partnerships to make the best, cleanest, most modern renewable technology available everywhere. Stop selling the dirty old technology that people in your own country don't want any more to people in another country...'

'Okay. So far so good.'

'Two. Look at the pricing of energy. Remove subsidies from conventional sources that make them artificially cheap. Count in environmental costs. Impose a pollution tax on the polluting energy systems. All of this will reveal the true economies of renewables.'

'I don't think the world's coal miners will be very happy with that one. But carry on...'

'Three, use less energy.'

'Ha! That's very idealistic. Telling people to use less of anything is hardly a vote-winner. It's just not going to work politically. You could try putting up the price and getting people to conserve energy that way, but only a government with a death-wish would do that...'

'Then you would agree with Hermann Scheer. He thinks it won't work either and we should just go hell for leather on renewables.'

'And you think?'

'I think he's got a point. It is true that what has happened with a lot of technical fuel-efficiency measures is that people don't do the *same* with *less*, they tend to do *more* with the *same*. Take cars: they are far more fuel-efficient now than they used to be but people are using just as much fuel, driving faster and further.'

'Because the price is too low?'

'Yes, the price is not a real one. But personally, I think it's possible to have both renewables and conservation.'

Gloria raised an eyebrow: 'How's that?'

'Values are changing. We are moving towards a kind of 'de-materialization' I think. It's already begun in the field of technology. Things are getting smaller, less material-intensive. And it's happening in the area of work and consumption. A lot of people in work are expressing the desire to get off the treadmill of long working hours, earning more to consume more. They value their free time more now, and are prepared to work less, earn less and consume less. And their interests are getting more non-material – you see that with all the books around on organic gardening or spiritual growth... How people spend their money is changing too; it's more likely to be spent on services like homeopathy or acupuncture, rather than just acquiring more things. It's part of a value shift away from materialism, from a culture of "the more the better"...'

'I don't see much of it!'

'Yes, it's true consumerism is still incredibly dominant. But the groundswell of disenchantment is growing. It's making marketing people think there just might be limits to the desire to consume. I don't know if it's happening at all in the South...'

'Not where I come from!'

'But it is happening in the North.'

'About time.'

'Exactly!'

'Point four,' continued Claire. 'Use consumer power to put pressure on companies to mass-produce items that use renewable energy, like hydrogen cars. Buy solar or other renewable energy items where you can.'

'Okay. And the fifth point?'

'Um... Five, join environmental pressure groups and campaign against proposals for new projects that do not use renewable sources. Don't let governments and corporations get away with repeating what they have always done. Social movements can make a difference as we have seen with the movement against nuclear in the West and the one against big hydro-schemes in India.'

That night Gloria dreamed that her possessions – her suitcase, her hairbrush, her shoes – were dematerializing before her eyes. The dream shifted to giant vegetables visibly growing.

The next day, on their way to the airport, she told Claire about it – somewhat warily, fearing a Freudian interpretation.

'Makes me think of Findhorn,' Claire remarked.

'What?'

'It's a spiritual community in Scotland. They have a good renewable energy centre. But they are also quite famous for growing huge vegetables on very poor soil and the reason they give for this is that they put spiritual energy into their work.'

She looked across at Gloria expecting a look of unadulterated scorn this time... But it was not forthcoming.

'So, what's special about that? People in Africa do it all the time. Nothing odd about communing with the spirits of nature to give you a healthy harvest...'

She was interrupted by her flight being called: BA 272 to Johannesburg.

'Well, here goes. I am about to use my entire energy allowance for the year and make my single greatest contribution to global warming,' sighed Gloria. 'Perhaps we could carry on this discussion via the Internet?'

'Are you connected?' asked Claire with the twinkle of a true nerd.

'We are getting a connection at the office. But you will come to South Africa all the same, won't you.'

'Yes, yes. I think I really need to. I've been thinking about what you said and I think you're right. I get carried away on a wave of enthusiasm and I don't really know enough, first hand, about the conditions on the ground in the South. I think I also, well. I think I talk too much and don't listen enough...'

Gloria laughed – and for once did not challenge.

Instead they hugged each other and went their separate ways; Claire to the bus station, Gloria to her plane.

As the plane gained height, the pilot talked about a tailwind that would hasten them on their journey and the sun suddenly appeared above the clouds. Gloria found herself looking at the natural world in a different way, as a place blessed with all kinds of clean renewable energy. The sun, the wind, the waves, all had a hidden potential that now she could see; they had natural rhythms that complemented each other. Flying over the sea she pondered its great powerful tides. The plane banked and suddenly she had the sun full in her face.

'The future?' she said to herself. 'Why not now?'

'Beg your pardon?' said the bespectacled man who had just woken up with a start beside her.

'Why not now?' she repeated, facing him. He blushed and buried his attention in the business pages of his newspaper. 'Strange woman,' he thought. 'Long journey,' he added, with a sigh. ■

Yes, but what can I do?

THERE ARE LOTS OF WAYS IN WHICH YOU CAN USE LESS ENERGY AND USE BETTER ENERGY. THEY ARE ALSO LIKELY TO SAVE YOU MONEY.

IN THE HOME

◆ **Temperature:** Heating accounts for half the energy consumed in the home. So the best – and simplest – thing you can do is turn it down. Turning the thermostat down by just one degree will knock ten per cent off your fuel bill. A maximum of 18 °C is usually adequate for most people. Elderly people and infants may need 21 °C.

◆ **Insulation:** Drafts account for 15-50 per cent of heat loss. Simple, relatively cheap measures like putting draft excluders around windows and doors and insulating the loft are often more effective than costlier options like double-glazing.

◆ **Environmental protection:** Passive solar heating – designing a building so that it uses the sun's energy to warm it naturally – is obviously the best. But if you are stuck with conventional means, then gas central-heating is probably the least damaging, most efficient and cheapest. Oil is dirtier than gas and incurs transport costs. Coal is the worst primary fuel for global warming and acid rain and open coal fires are appallingly inefficient. Electricity is expensive and is often uncleanly generated. The most environmentally-friendly fuel you can use is wood from a sustainably-managed woodland.

◆ **Water heating:** Solar water heating is the most eco-friendly. Even in a cool climate it can provide 40-60 per cent of hot water required for an average house. Insulating hot water pipes also helps. But probably the biggest saving you can make is to have showers instead of baths: they use just a sixth of the water.

◆ **Appliances:** Gas appliances are almost always more efficient, cleaner and cheaper to run than electrical ones. Microwave ovens use little energy compared to a cooker – but any energy saving is totally lost if you buy frozen convenience food to put in it. Pressure cookers are good and jug kettles better than others. A good toaster is more efficient than a grill.

If buying a new refrigerator or freezer, check that it has good insulation, is CFC-free, and isn't bigger than you need. Site away from heat sources. Try switching it off in winter months.

When buying a washing machine, a side-filling type that has a half-load setting and heats its own water is best. Gas tumble-driers are better than electric. Dishwashers are expensive to buy and run, and should be used only when full.

TVs, radios, hi-fi and computers use very little energy. Most of the energy is used in making them. Rechargeable batteries for small appliances are very much more environmentally sound.

◆ **Lighting:** Energy-saving lightbulbs are really worth having. One energy-saving bulb lasts as long as eight ordinary bulbs and costs less than half the price of eight such bulbs.

OUT AND ABOUT

Most car journeys are for under five miles so try asking yourself if you really have to make that trip to work or to the shops by car. Couldn't you walk or cycle? If not, trains are better than motor vehicles, and public transport is much better than private.

The very worst thing you can do is fly – the energy costs are truly astronomical. A one-way flight from London to Melbourne will use up, per person, as much as the average Northern household uses in space and water-heating in one year. Shorter hops are even more wasteful.

LOCAL ACTION

This is one area in which your local actions can have global impacts. Your local authorities could follow the Californian example and legislate for zero-emission vehicles. Or public buildings could be run on solar heating or constructed using passive solar architecture. Getting your local political representatives on side can make a big difference. The German city of Freiburg, for example, is on the way to becoming a model 'green city', thanks to progressive city planners. And a scheme for part of the medieval city of Regensburg, using renewable energy and solar architecture, could become a model for other cities in the world – and it's getting European Union funding.

ACTION ON ENERGY

GROUPS AND AGENCIES

There are a number of organizations working for an energy revolution.

AOTEAROA/NEW ZEALAND

Greenpeace Private Bag 92507, Wellesley Street, Auckland. Tel: (9) 377 6128. Current climate campaign that promotes solar energy and targets carbon dioxide emissions.

AUSTRALIA

Greenpeace PO Box 139, Surry Hills, NSW 2010, Australia. Tel: (9) 02 211 4066. Current climate campaign that promotes solar energy and targets carbon dioxide emissions. **Australian Conservation Foundation** 340 Gore St., Fitzroy, VIC 3065. Tel: (3) 416 1166. Focuses on sustainable energy and better efficiency in energy production and consumption. **World Information Network on Energy (WISE)** PO Box 87, Glen Alpin Q 4381. Tel +61 76 834 364. Fax: +61 76 61719.

CANADA

Citizens for Renewable Energy RR 4 Lion's Head, Ontario NOH 1WO. Tel/fax: (519) 795 7725. Active campaign group, especially against nuclear. **Greenpeace** 185 Spadina Avenue, 6th Floor, Toronto, Ontario M5T 2C6. Tel: 416 345 8408. Current climate campaign that promotes solar energy and targets carbon dioxide emissions.

SOUTH AFRICA

Women's Energy Group, Energy and Research Development Centre, University of Cape Town, Private bag, Rondebosch 7700. Tel: 27 21 789 2920. Fax: 00 27 21 6503230.

UNITED KINGDOM

Greenpeace Canonbury Villas, London N1 2PN. Tel: (44) 171 354 5100. E-mail: solar@greenpeace.org.uk. worldwide web: http/www.greenpeace.org/. Current climate campaign that promotes solar energy and targets carbon dioxide emissions. **Intermediate Technology Development Group** Myson House, Railway Terrace, Rugby CV21 3HT. Tel: (44) (0)788 560631. Fax: (44) (0)788 540270. Works to electrify rural areas using appropriate technology and a 'people-centred' approach. **IT Power** The Warren, Bramshill Road, Eversley, RG27 OPR. Tel: (44) (0) 1734 730073. Fax: (44) (0)1734 730820; E-mail: itpower@gn.apc.org. Develops renewable energy sytems worldwide. **Alternative Technology Association** Centre for Alternative Technology (see below), ATA Freepost Machynlleth, Powys, SY20 9BR for membership details.

UNITED STATES

The American Solar Energy Society 2400 Central Avenue, Unit G-1, Boulder, CO 80301. Tel: (1) 303-443-3101. E-mail; ases@ases.org. Publishes *Solar Today* and sponsors a major annual solar convention. **The American Wind Energy Association** 122 C St. NW 4th Fl 20001-2109. Tel: (1) 202-383-2500. Researches and provides information on wind energy. **The Alliance to Save Energy** 1725 K St.NW, Ste. 509, Washington, DC 20006-1401. Tel: (1) 202-857-0666. E-mail ase@ase.org. Promotes energy efficiency through research, demonstration projects, lobbying, and education. **Rocky Mountain Institute** 1739 Snowmass Creek Road, Old Snowmass, CO 81654-9199. Tel: (1) 970-927-3851. Fax: (1) 970-927-4178. E-mail: Orders@rmi.org Founded by energy conservation pioneer, Amory Lovins. Information on energy efficiency and sustainable technology.

Worth reading

Solar Hydrogen Energy: The power to save the earth by John O'M Bockris, T Nejat Veziroglu and Debbi Smith (Optima 1991) is one of the best popular, well-informed books about. The theory is inspired and the presentation zappy, with great cartoons by Heidi Weiss. **A Solar Manifesto** (James and James, 1994) is an impassioned polemic by Europe's leading politician-advocate of renewable energy, Hermann Scheer. The writing's turgid at times but the ideas are robust, lucid and uncompromising. **Renewable Energy: Power for a Sustainable Future** edited by Godfrey Boyle (Open University, OUP 1996) is an excellent, accessible resource that manages to be both thought-provoking and tell you how the things actually work. **Renewable Energy: Sources for Fuels and Electricity** (Island Press, 1993) edited by Thomas B Johansson, Henry Kelly, Amulya KN Reddy, and Robert H Williams, is a big global batch of academic essays, with some interesting case histories. **The Future of Energy Use** (Earthscan 1995) by Robert Hill, Phil O'Keefe and Colin Snape has more of a textbook feel. It deals authoritatively with conventional energy systems as well as renewable ones, and is hot on the economics. **Power Surge** by Christopher Flavin and Nicholas Lennsen (Earthscan, 1995) is a thoroughly researched guide to the coming energy revolution that leaves one with an overwhelming feeling of hope. Finally, slightly at a tangent but still connected, is the formidably comprehensive, useful and fun **Millenium Whole Earth Catalog** (Harper Collins, 1994) edited by Howard Rheingold. This is the alternative lifer's illustrated bible, with the alternatives ranging from the more imaginative sexual practices to organic gardening, eco-tourism and sustainable energy systems.

INTERNATIONAL

International Institute for Energy Conservation works to accelerate the global adoption of energy efficient policies, technologies and practices to enable economic and environmentally sustainable development. **Main Office:** 750 First Street, NE, Suite 940, Washington DC, 20002. Tel: (1) (202) 842-3388. Fax: (1) (202) 842-1565. **Asia Regional Office:** Sukhumvit Soi 49/9, Bangkok, 10110, Thailand. Tel: (662) 381-0814. Fax: (662) 381-0815. **Latin America Regional Office:** Carmencita 110, No 102 Las Condes, Santiago, Chile. Tel/Fax: (562) 233-2870. **Europe Office:** 1-2 Purley Place, London N1 1QA, UK. Tel: (44) (0)171 704-6737
International Solar Energy Society (ISES) PO Box 124, Caulfield East, 3145 Victoria, Australia.

ASIA

Indian Renewable Energy Development Agency Indian Habitat Centre Complex, Lodhi Road, New Delhi 110-003. Supports the promotion, development and financing of renewable energy in India. **Tata Energy Research Institute (TERI)** Darbari Seth Block, Habitat Place, Lodhi Road, New Delhi 110-003. Tel: +91 11 462 2246/460 1550; E-mail: pdadhich@teri.ernet.in. Researches energy technology and environment policies.

EUROPE

Eurosolar e.V, Plittersdorfer Strasse 103, D-53173, Bonn, Germany. Tel: +49 22 836 23 73; Fax: +49 22 836 12 79. A 20,000-strong European pressure group for renewable energies. **World Information Service on Energy (WISE)** PO Box 18185, 1001 ZB Amsterdam, Netherlands. Tel: +31 20 6126368. Fax: +31 20 6892179. An international switchboard for local and national safe energy groups around the world to exchange information and support.

ALTERNATIVE SOURCES

If you want to explore alternative sources of energy there are a number of suppliers, consultants and resources:

UNITED KINGDOM

The Centre for Alternative Technology Machynlleth, Powys, SY20 9AZ, England. Tel: (+44) (0)1654 702400. Fax: (+44) (0)1654 70278. E-mail: cat@gn.apc.org. The centre publishers a huge range of how-to books and leaflets. *Off the Grid* and *It's a Breeze!* and *Save energy, save money,* for example have extensive resources sections and provide names and addresses of renewable energy systems suppliers. **Dulas Engineering** The Old School, Eglwysfach, Powys, SY20 8SX, Wales. Tel +44 1654 781332. Fax: +44 (0)1654 781390. E-mail: dulas@gn.apc.org. Provides advice and can custom-build equipment to suit individual needs.

UNITED STATES

Real Goods Trading Corporation 555 Leslie St., Ukiah, California, 95482-5507, USA. Tel: (1) (707) 468-9292. Fax: (1) (707) 468-9394. E-mail: realgoods@realgoods.com. Publishes the **Solar Living Source Book**, a comprehensive how-to book and mail order catalogue for solar panels, micro-hydro systems, wind turbines. Also has an extensive resources section, with contact information for other renewable energy systems suppliers.

JOURNALS

The Safe Energy Journal, international magazine of Friends of the Earth Scotland's Safe Energy Unit, 72 Newhaven Road, Edinburgh EH6 5QG, UK. ***IT Power News***, international magazine of IT Power, The Warren, Bramshill Road, Eversley, Hants. RG27 OPR, UK. ***Solar Today***, magazine of The American Solar Energy Society, 2400 Central Avenue, Unit G-1, Boulder, CO 80301, US. ***Renew***, bi-monthly magazine of the Network of Alternative Technology and Technology Assessment (NATTA), c/o Faculty of Technology, The Open University, Walton Hall, Milton Keynes, Bucks, UK. Fax: +44 0908 653658.

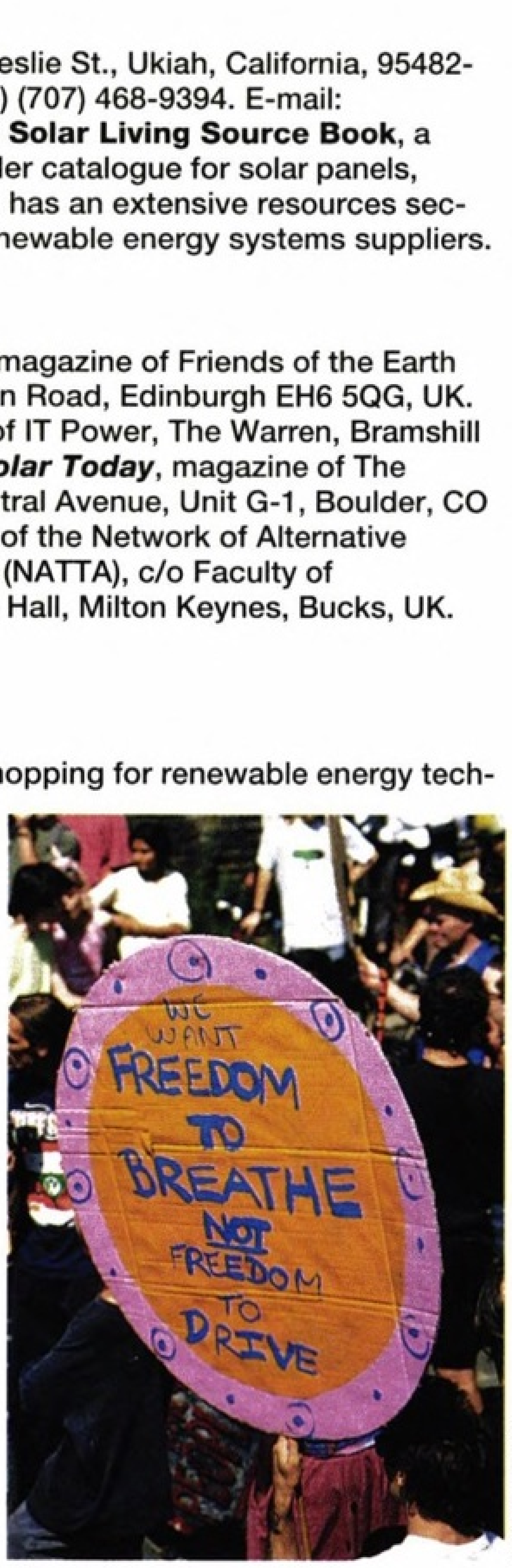
INTERNET-WORKING

http://www.realgoods.com/
On-line products catalogue, interactive shopping for renewable energy technologies, discussion forum, technical assistance, consulting services.

http://www.foe.co.uk/CAT
The Centre for Alternative Technology's home page.

http://www.greenpeace.org/climate/
Climate campaign information plus Interactive Climate Quiz, and a space to write a letter to President Clinton that you can e-mail directly to the White House.

http://www ises.org/
The International Solar Energy Society's home page. Includes information on the society and all its national branches, information on solar energy conferences and recent technological developments, and an on-line version of ISES's magazine, *Sun World.*



STEVE COX

The **NI** Interview

Nooria Jehan

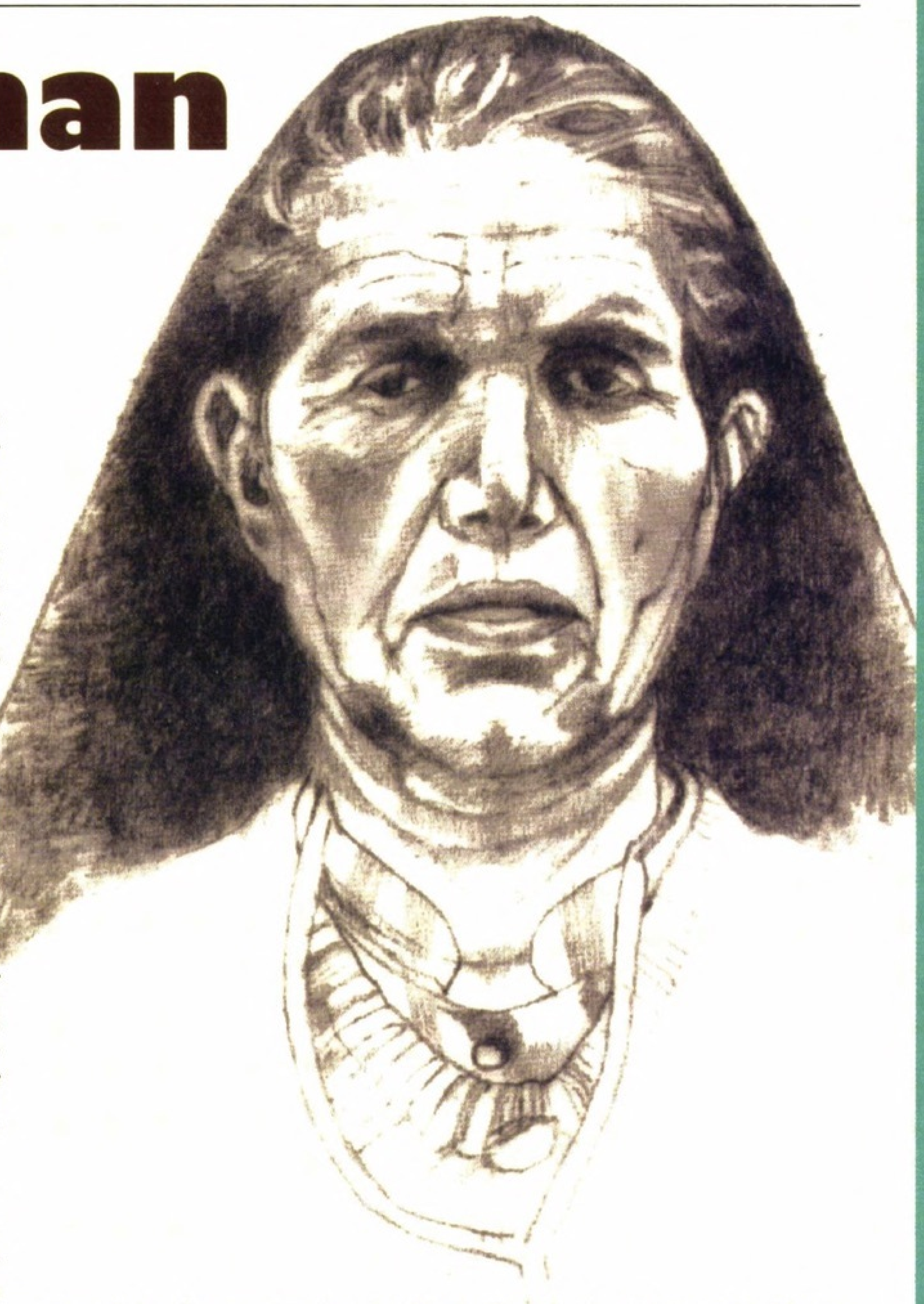


ILLUSTRATION BY ALAN HUGHES

Afghani freedom-fighter and feminist **Nooria Jehan** talks to **Christine Aziz** in Kabul.

NOORIA JEHAN sweeps into the room – her feet and hands the only visible part of her body except for a glimpse of her eyes behind the embroidered grill of her *bourqa*. Dramatically she flings the *bourqa* back behind her shoulders revealing an aquiline nose, piercing eyes and mocking smile. Women rise from the *kelim* cushions scattered around the walls to embrace her in greeting. A veteran freedom fighter in her forties and mother of seven children, she belies the Western media cliché of the submissive Muslim woman.

We sit together and she begins to speak in Farsi, in a voice that is both forceful and expressive. No doubt her companions have heard it many times before, but they sit spellbound. She speaks against a background of intermittent artillery and mortar fire and the thud of rockets less than 13 kilometres away. None of the women take any notice.

Before the Soviet invasion of Afghanistan Nooria had been a young mother concentrating on bringing up her children. With the arrival of Russian troops in 1979 she became one of hundreds of women to join the *mujahideen* (Afghani freedom fighters) and fight the Soviet occupation over the next decade. Along with other resistance forces she helped oust the pro-Soviet regime of President Najibullah in 1992 in favour of Burhanuddin Rabbani and his military commander, Ahmed Shah Masud.

Nooria first became involved in the Jihad (Holy War) by distributing 'night papers' – resistance pamphlets – to civil servants. 'These people had no access to the *mujahideen* activities,' Nooria recalls. 'After one year the *mujahideen* asked me to take part in terrorist activities and gave me a gun. But I found it difficult just to shoot people and it was easy for the enemy to capture us because everyone was looking for guns. So I learned explosive techniques and began supervising and teaching the younger men. I was leading them into ministries like the Ministry of Defence, aiming directly at Russian offices. We would stick explosives and detonators under the Russians' tables and chairs.'

Early one morning the Russians came to her house and arrested her. 'They said I was a leader and sentenced me to 18 years in prison. The Russians were lawless, but their interrogation was of a human nature. There was no beating up, but a lot of electric shocks,' she recalls. After two years in prison she was released in exchange for an Afghan communist and a Russian who had been held by General Masud.

> ***There are so many widows in this city who are struggling to bring up families on their own. If women have to stay at home all day, the city will starve.***

Afghan women have borne the brunt of 16 years of war and internecine fighting. When territory changes hands after long battles, the conquerors often celebrate by killing and raping women. In Kabul, women have been ordered to stay home by the Government and to wear the *bourqa*. But many have defied orders from Rabbani's Islamic State, settling instead for small scarves that cover the hair. The Government has little choice but to turn a blind eye. 'We have to go out in the streets to get food, firewood and water,' Nooria stresses. 'There are so many widows in this city who are struggling to bring up families on nothing. If women have to stay at home all day, the city will starve.'

Nooria and her friends now face a new threat: a group of Islamic extremists called the Taleban. This group emerged in 1994 as a major force in Afghan politics. Composed of young men from Pakistani refugee camps, they captured Afghanistan's second largest city, Herat, and have laid siege to the city of Kabul since October 1995. As the Taleban continue to launch rocket attacks on the city, women's support for the besieged Rabbani Administration has become a critical factor in his Government's survival. If he is ousted the Islamic extremists would almost certainly strip Kabul's women of what rights they have left.

Nooria considers the Taleban as much of a threat to her land and the dignity of the country's women as the Russians. But what will she do if the Taleban succeed in capturing Kabul?

She pauses for a moment and then claps her hands laughing: 'We will fight them as we fought the Russians. The Taleban think they will be able to force us into our homes at gunpoint like they did the women in Herat. They will be mistaken. But we are tired. What we want more than anything is peace. We want the rockets to stop.' ■

Reviews

film

The Secret of Roan Inish

directed by **John Sayles**

John Sayles is one American director who manages to survive and make films that have a political dimension when all around seem to be driven by more commercial considerations. It is something that he has been doing for the last 15 years. Sayles' films have tackled questions of sexual identity, with the 'coming-out' tale *Lianna;* race with *Brother from Another Planet;* union politics with *Matewan*, set in a West Virginian mining town in the 1920s. His last, *Passion Fish,* is one of the few films to have dealt sensitively with disability but, as with Sayles' other work, without treating the issue on the nose. For Sayles sews the politics most subtly into the seams of his films.

Intelligent and captivating: director Sayles' exploration of myth and loss of community.

This is very much in evidence in his latest film, **The Secret of Roan Inish.** Set on the Irish coast just after World War Two, ostensibly it seems to be 'family' fare, with its tale of Fiona (Jeni Courtney), a little girl who goes to stay with her grandparents and becomes entranced by the stories of the 'Selkies', mythical creatures that are half human, half seal who supposedly live on the islands nearby. She also hears about how her baby brother was swept out to sea in his cradle and starts to have sightings of the cherubic sibling. Fond fancy, or is there a truth to this? Exquisitely photographed by Haskell Wexler, **The Secret of Roan Inish** celebrates the beauties of the land and seascapes, while drawing on Celtic culture and legend. It also infers how communities can be swept away, not by the elements, but financial considerations – Fiona's grandparents are threatened with eviction to make way for a holiday home. In this it is a moving reflection on Fiona and her family's relationship to the land and sea that they have worked and fished, and how that forges the folklore. Ever intelligent and quite captivating, **The Secret of Roan Inish** will not fail Sayles' fans, while it should recruit more from a younger generation.

Politics ☆☆☆
Entertainment ☆☆☆☆ **LF**

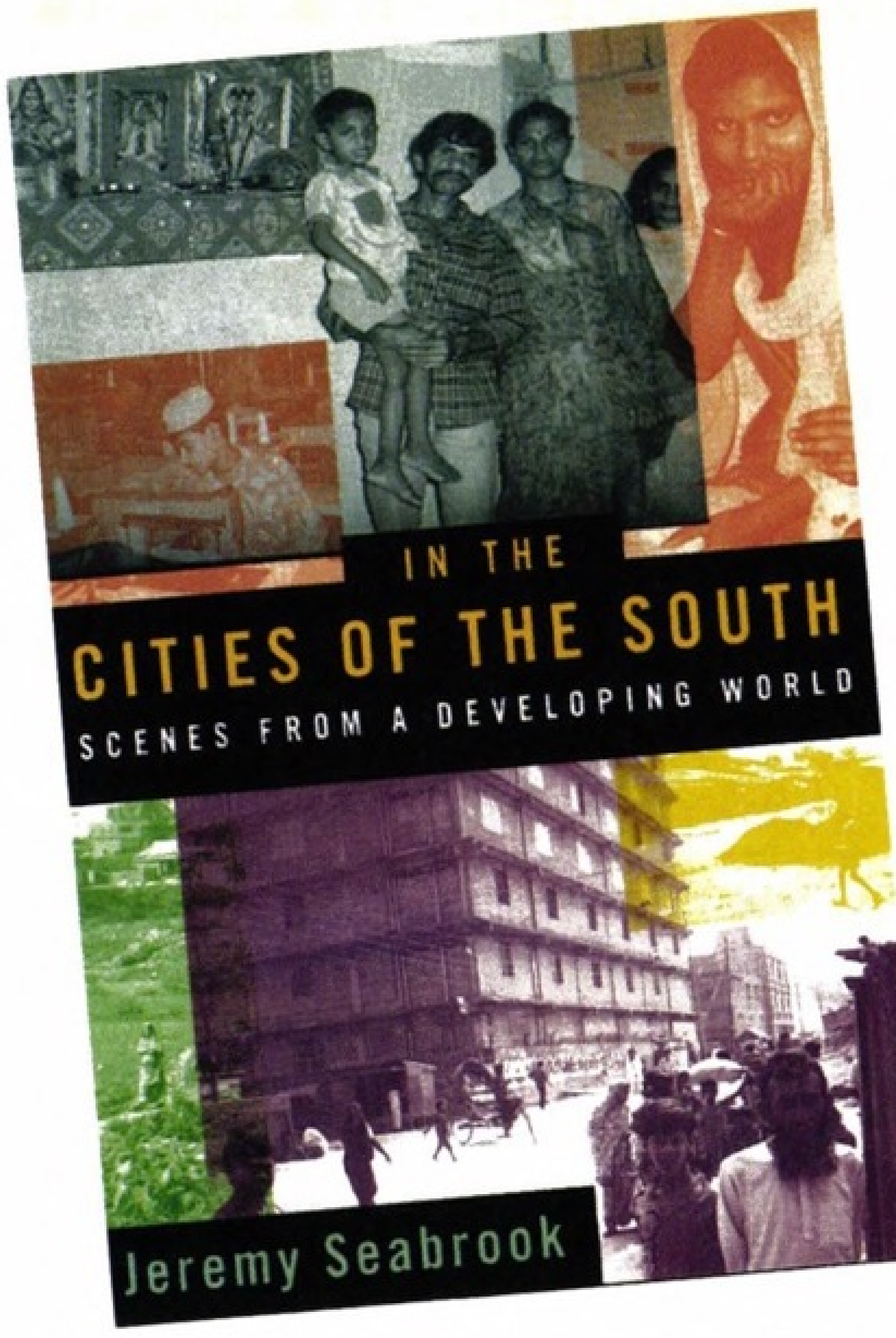
books

In the Cities of the South: Scenes from a Developing World

by **Jeremy Seabrook**

(Verso ISBN 1-85984-081-7)

There is much Western agonizing over the exact moment when we can say that over half of the world's population is urban. Has it already happened? What will be the consequences? Are terms like 'population explosion' and 'catastrophe' useful ones? In a long and committed writing life, Jeremy Seabrook has written widely on themes of urbanization, development and poverty. In his new book he focuses on the experiences of people in the rapidly expanding cities of South Asia. Looking beyond the shibboleths like 'tiger economy' and the convenient and dismissive shorthand of sweatshop labour, he examines the realities that shape the destinies of those for whom the concept of a global economy is of more immediate importance than the ready availability of consumer goods. Drawing striking parallels with the earlier industrial expansion of Britain, he charts the rise of the megacities and graphically illustrates how transnational capitalism with its 'structural adjustment' and 'export zones' has failed and continues to fail those to whom the city has become an irresistible magnet. From Jakarta to Bombay, Kuala Lumpur to Manila, the picture is of communities under siege but forging collective defences of organization, education and association.



While Seabrook applies a scholarly rigour to his work, he does not patronize and he does not preach. Rather, he is open to learning from those to whom he talks and is able to communicate what he has heard; what Brecht called 'watching the people's mouth'. What sets this book apart from the standard, arid academic discourse on 'the poor' or 'the South' is *involvement.*

In setting down the mosaic of lives that constitute the body (and soul) of his narrative, Jeremy Seabrook does so as an active participant, not an outside observer. He rightly remarks on the sentimental falsity of calling 'heroic' lives of such stringent adversity; adding the burden of noble suffering to those already carried.

Like a city, this wonderful book seethes with light, action and endlessly varied personal dramas. I can only, in a spirit of solidarity with the many lives it describes, urge you to read it. It will make you weep, it will make you angry, but it will give you an abiding sense of the human capacity for hope, struggle and progress.

Politics ☆☆☆☆☆
Entertainment ☆☆☆☆ **PW**

S'amore 'e Mama

by **Tenores di Bitti**
(Virgin/Real World CDRW 60)

ONE OF THE STRANGER releases of the year, **S'amore 'e Mama** (The Mother's Love) is, perhaps, also one of the most compelling. A collection of Sardinian folk song, using styles that date back to the Bronze Age, it is a music that reflects its geographical home. Sparse and unadorned, these are chants and songs that have been sung by shepherds into the face of the wind, their language a barely recognizable Italian. The guttural, four-part harmonies of the singers seem resilient to the ravages of time. If the stones of the island's ancient circular stone buildings – *nuraghes* – could speak, they might well sound like this.

The Tenores are four musicians from the small town of Bitti, and they have compiled a series of 'canti' which deal with every aspect of day-to-day life. There are songs about nature, artisans' chants and, for recreational purposes, dance songs. There's a smattering of religious ones, which, nominally Christian, display in their lyrics a residue of a religion much older. Musically, the Tenores' material reflects not just the natural sounds of the island – hissing wind or bleating sheep – but also the history of the place. Isolated from much of the everyday traffic of Europe, Sardinian music has hung on to sounds, cadences and tonalities that suggest all the influences of the continent's early migrants. It's not only Italian music, but also Greek, Arabic and Spanish, meeting in a heady ancient mix. It's not surprising, given jazz music's interest in the unconventional, that Lester Bowie and Ornette Coleman have picked up on the Tenores' singular style.

Produced by Canadian musician Michael Brook, **S'amore 'e Mama** has been recorded with minimal studio interference. Recording the songs in their natural habitat, the churches, bars, canteens, and countryside, Brook has added a modicum of ambient sound into the mix. Too often, 'world music' can veer in two contrary directions: the ethno-musicologists or the purely 'exotic', as if the music existed either for academics, in the first instance, or the stereo system tourists, in the second. This is neither. It's certainly functional music, but it's also social and joyful in a quite, idiosyncratic manner which makes this an altogether captivating record.

Politics ☆☆☆
Entertainment ☆☆☆

LG

STAR RATING

Excellent	☆☆☆☆☆
Very good	☆☆☆☆
Good	☆☆☆
Fair	☆☆
Poor	☆

Reviews by **Louise Gray, Peter Whittaker** and **Lizzie Francke**
Reviews editor: **Vanessa Baird**

THE **CLASSIC**

Spartacus

...being the book of rebellion and hope

IF THERE'S A SINGLE image that most of us have of Spartacus it's that of rows upon rows of slaves standing up at the end of the 1959 film, all of them shouting out, 'I'm Spartacus!'

But the story of Spartacus the slave is even more remarkable than the story acted out by Kirk Douglas in glorious wide-screened Technicolor, although there are of course some points of contact. The film was inspired by a novel of the great American radical author Howard Fast, and traced the course of the slave rebellion from its beginnings with a small group of Gladiators in Capua sometime around the summer of 73 BC, through to their defeat and mass crucifixion along the Appian way in the Spring of 71 BC.

The very duration of the Spartican war provides a hint that there may be something more to tell.

It took another book to tell it, **Spartacus**, written in 1931 by Scottish writer Lewis Grassic Gibbon (James Leslie Mitchell).

Mitchell belonged to that rare category of socialist authors who can write entertainingly about the things they believe in.

Kirk Douglas leads a wide-screened slaves' revolt.

What is particularly striking about Mitchell's account is the way in which he manages to place the tensions inside the slave camp rather than between Spartacus and the Roman leader, Crassus. In Mitchell's book the group of around 70 gladiators, who had managed to secure their escape to a defensible position on Mount Vesuvius and repulsed the local Roman troops, quickly became a rallying point for all manner of slaves from the surrounding territories. Their attempt to secure personal freedom rallied together a small army of Thracians, Germans, Gauls and Roman-born slaves, not all of them pulling in the same direction.

The course of the revolt shows the tremendous tensions which this created within the slave ranks. For the Germans and Gauls 'home' lay to the north and over the Alps. Others in the slave camp were already 'home' and had nowhere else to run to. For almost two years the slaves wavered between a policy of holding on to southern Italy and one of breaking out through the north and into freedom.

In Mitchell's book, and in the various Roman accounts of the revolt (notably Plutarch's *Crassus* and Appian's *Civil Wars*), the slave army managed to destroy legion after legion of Roman troops, inflicting five humiliating defeats upon the previously undefeated forces of Rome. Then the slave army aimed for an assault upon Rome itself.

The reasoning behind the attempt upon Rome is a matter of debate. Were they simply a predatory force drunk with their own success and hungry for an impossible plunder? Were they inspired by some primitive notion of 'liberty' or 'freedom' which is lost to us? For what it's worth, my own belief is that given the composition of the slave army, the conquest of Rome was the only possible resolution of the conflict which could satisfy the aspirations of the whole body of the slaves, by destroying both the domestic masters and allowing a return to their homelands for those who still harboured such desires.

Yet this too is conjecture. Fresh Roman Legions, the advance of autumn and the threat of winter drove the slave army back down into the south leaving them trapped in the peninsula of Bruttium. Their subsequent escape from the peninsula, through the snows and their outmanoeuvring of the Roman Legions gave them a stay of execution but only until the spring. The end, in Mitchell's version, came when Gauls and Germans split off from the main force to try and break out through the north. Instead they quickly found themselves trapped and were defeated by Crassus. The truth is probably simpler. The slave forces were continually having to split up to secure forage. Crassus had been exploiting this for months, by picking off small bands of slaves.

Mitchell doesn't shy away from the brutality of ancient slavery and the related brutality of the slave army. The central focus is on the tension between the half-articulated notions of 'liberty' and 'freedom' which he gives to the slaves, and the brutalizing reality of slavery. The course of the rebellion is itself a passage from brutality to hope, hope which is at its peak in the last desperate throes of rebellion. ■

Tony Milligan

***Spartacus* by Lewis Grassic Gibbon (James Leslie Mitchell)** is available in a reprint by Redwords, London, 1996.

Curiosities

QUESTIONS THAT HAVE ALWAYS INTRIGUED YOU ABOUT THE WORLD WILL APPEAR IN THIS, YOUR SECTION, AND BE ANSWERED BY OTHER READERS. PLEASE ADDRESS YOUR ANSWERS AND QUESTIONS TO 'CURIOSITIES'.

What problems are Western tobacco companies causing in Third World countries?

● Western tobacco companies pay very low prices for the tobacco grown in the Third World. This means Third World growers have to produce and sell an awful lot of tobacco. In Malawi intensive tobacco cultivation started in the central region of the country. This area is now bare. Tobacco growing has moved into the north and this area is also becoming deforested.

The Government of Malawi encourages people to grow tobacco as part of the Poverty Alleviation program. But there is no control over where it is grown. And because food crops do not fetch as high a price as tobacco only the poorest people, who cannot get loans for inputs to grow tobacco, grow any food.

The result is that Malawi is completely unable to feed itself and depends on Western donor countries for handouts.

But I don't think it's right to point the finger only at Western tobacco companies. What about tobacco consumers?

Kamkwamba Kalea
Blantyre, Malawi

● Tobacco production destroys *miombo* woodlands which are the forests of the savannah eco-zones of Africa. The large growers tend to flue-cure their tobacco, which means drying it in large barns by burning fuelwood to heat the air inside the barn. It has been estimated that between seven and eleven hectares of natural *miombo* woodland are required to cure just one hectare of tobacco.

When I was working in the Namwara district of Malawi for the Commonwealth Development Corporation in 1989 I was shocked by the wasteland left by tobacco farming which not only destroys the forests but also quickly exhausts the soil. The Commonwealth Development Corporation itself was growing tobacco for no better reason than to provide cash flow.

Thousands of Malawian farmers have been moved off their land to make way for large tobacco estates. But ordinary Malawian farmers – mainly women – do not benefit from the tobacco economy: the profits from export earnings go to an élite, so that when food crops fail ordinary people cannot afford to buy in the shortfall.

So, to smokers: your cigarette is not only bad for your health but is also causing forest loss and starvation in Africa.

Nick Ashton-Jones
Environmental Rights Action
London, England

AWAITING YOUR ANSWERS

We hear about the descendants of Black African slaves in the Americas and the Caribbean and the eventual abolition of slavery in these parts. But what happened to the Black African descendants of the Arab slave trade? Were they ever freed? Did they die out due to the custom of castrating the males?

Kamkwamba Kalea
Blantyre, Malawi

IF YOU HAVE ANY QUESTIONS OR ANSWERS PLEASE SEND THEM TO **CURIOSITIES, NEW INTERNATIONALIST, 55 RECTORY ROAD, OXFORD OX4 1BW, UK**, OR TO YOUR LOCAL NI OFFICE (SEE INSIDE FRONT COVER FOR ADDRESSES).

THE VIEWS EXPRESSED IN THIS SECTION ARE NOT NECESSARILY THOSE OF **NI**.

The **NI** Crossword

No. 4 by **Axe**

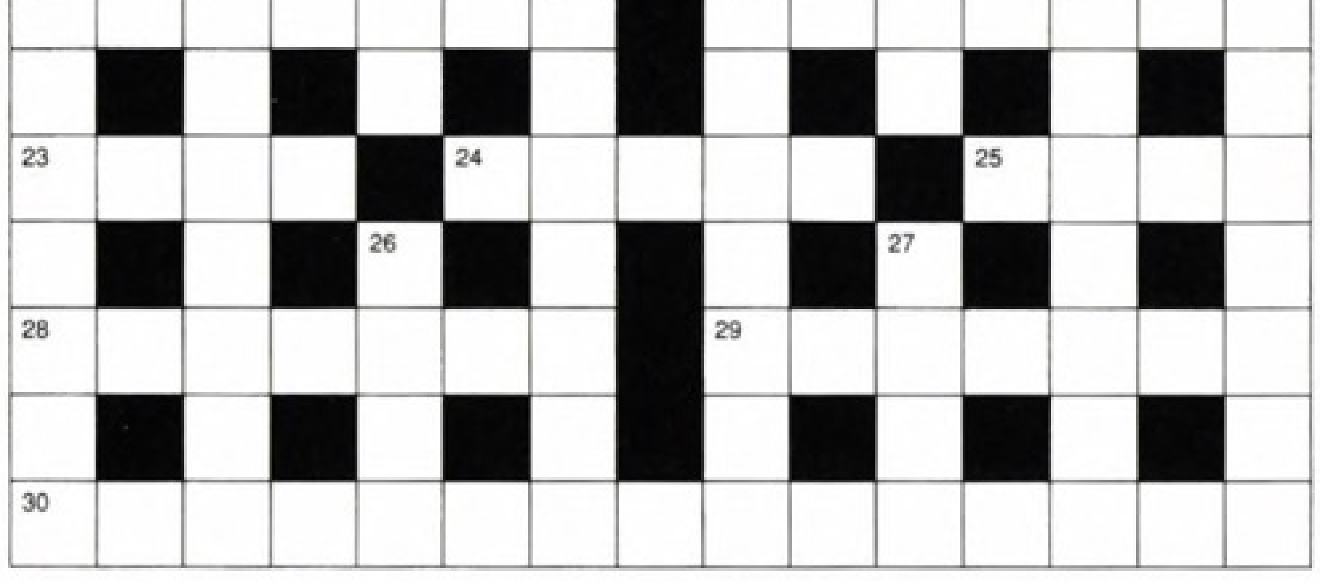
CRYPTIC

Across

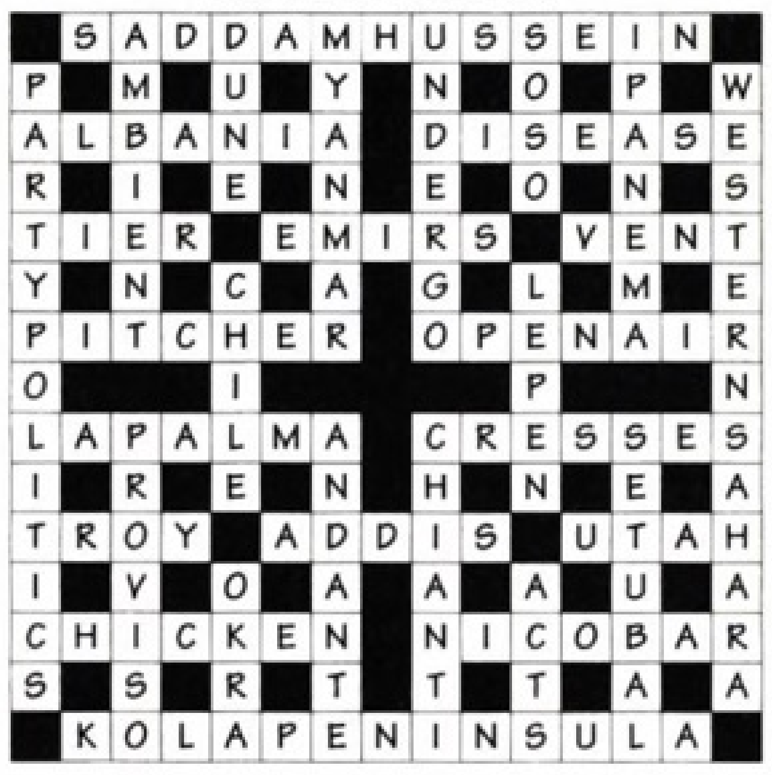
1 Mathematician's team apparatus used to raise water (10,5)
9 Understanding which between the French and British was once warm (7)
10 Messy, sticky substance found on returned Associated Press document. (7)
11 Cain murdered civilization (4)
12 Creature, result of parrot-terrapin union (5)
13 It's the equivalent of Poseidon losing net in India (4)
16 Reservoir where Raquel, if disoriented, gets left out (7)
17 Asian waterway with North-East Wales connections (7)
18 Island anger prior to capture... (7)
21 ...of pirate with what sounds like a bawdy song... (7)
23 ...promotes disorder (4)
24 Back mother, to a degree, against First National's capital. (5)
25 Ukraine chicken? (4)
28 Liam's back in the eleven for the Muslim group (7)
29 The Baltic's towering hotel! (7)
30 Greek character to evacuate liberated sector where the Bomb is banned. (7-4,4)

Down

1 Unreliable Rio anti-Nazi came with US character (15)
2 Tannin extract obtained from calcium on broken chute (7)
3 St Columba's landing at ten on North Atlantic establishments (4)
4 He votes for the German prince... (7)
5 ... she needs no votes: some (not Old English) peers in revolt (7)
6 Ditches the fools (4)
7 Change direction concerning tour around the Orient... (2-5)
8 ... and head in the opposite direction going on to region immediately around Cape Town (7,8)
14 Sounds dire when bottom falls out of county in 18, revealing innards... (5)
15 ...the county in 18 names the girl! (5)
19 Stop mice cavorting around here all the time (7)
20 He explored the more humid surrounds of India first (7)
21 Book part for a meeting (7)
22 He succeeds, Hiro Hito takes lead from Tahiti knock-out punch (7)
26 Check back the flow (4)
27 Hole in flesh. Abandon silence – thin ice here (4)



LAST MONTH'S SOLUTION



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C	H	I	C	K	E	N	■	N	I	C	O	B	A	R
S	■	S	■	R	■	T	■	T	■	T	■	A	■	A
■	K	O	L	A	P	E	N	I	N	S	U	L	A	■

QUICK

Across

1 Form of basic turbine still used to obtain water from the Nile (10,5)
9 Friendly understanding between countries (7)
10 Type of paper made by ancient Egyptians (7)
11 Pre-conquest civilization of South America (4)
12 Aquatic carnivore, Lutra lutra in Europe, Lutra canadensis in North America (5)
13 Indian city of the Raj, in the state of Maharashtra (4)
16 Natural underground reservoir (7)
17 Major river of Burma, rising in Tibet (7)
18 Member state of the European Union (7)
21 North African-based pirate of the 16th Century (7)
23 Acronym for the disease caused by the human immunodeficiency virus (4)
24 Arab capital city built on the ancient capital of the Ammonites (5)
25 The third-largest city in the former USSR, on the confluence of the Desna and Dnieper rivers (4)
28 Shi'ite Muslim sect which has the Aga Khan as spiritual head (7)
29 Capital of Estonia, a former member of the Hanseatic League (7)
30 Declaration preventing localized nuclear activity (7-4,4)

Down

1 The assimilation of a foreigner, for example, into the ways and customs of the US (15)
2 Vegetable extract, like gambier, that contains tannin (7)
3 Scottish island from where Christianity spread in 563 AD (4)
4 A prince of the Holy Roman Empire (7)
5 The ——— of Blandings – Wodehouse's porcine creation (7)
6 Drains strength (4)
7 Plot a new course for someone (2-5)
8 Area around Cape Town famous for its rugby team (7,8)
14 Edible internal organs (5)
15 Cambridge's second college, founded 1326, and Irish county (5)
19 Only found in a particular region, or regions. (7)
20 17th-18th Century English explorer who circumnavigated the globe three times (7)
21 Meeting of a knightly order (7)
22 Son of Hiro Hito who became Emperor of Japan in 1989 (7)
26 A marked trend of fortune (4)
27 Ice, floating as a sheet (4)

ENDPIECE

White earth

Why **Winona LaDuke** wants her land back.

OVER THE PAST 500 YEARS the indigenous experience has been one of conflict between the indigenous and the industrial world view. This conflict has manifested itself as holocaust. Indigenous people understand clearly that this society, which has caused the extinction of more species in the past 150 years than the total species extinction from the Ice Age to the mid-nineteenth century, is the same society that has caused the extinction of about 2,000 different indigenous peoples in the Western Hemisphere alone. Bartholomew de las Casas and other contemporaries of Columbus estimated that 50 million indigenous people perished in a 60-year period. In terms of millions of people, this was probably the largest holocaust in world history.

We understand intimately the relationship between extinction of species and extinction of peoples, because we experience both. And the extinction continues. Just last year the Bureau of Indian Affairs, which has legal responsibility for people like myself, declared 19 different indigenous nations in North America extinct. The rate of extinction in the Amazon rainforest has been one indigenous people per year since 1900.

Now it is not appropriate for me to say that my holocaust was worse than someone else's holocaust. But it is absolutely correct for me to demand that my holocaust be recognized. And that has not happened in America. Nobody knows anything about the native people. Why? Because we are erased from public consciousness; because if you have no victim you have no crime.

The challenge that people of conscience face is to come clean, become honest and recognize our demands. People must see the interlocking interests between their own ability to survive and indigenous peoples' continuing cultural sustainability. I am absolutely sure that our societies could live without yours, but I'm not so sure that your society can continue to live without ours.

All across this continent there are native peoples, in small communities with populations of 100, 500, even 5,000, who are trying to regain control of their community and their territory. I'll use my own community as an example. Here is our story.

The White Earth Reservation, located at the headwaters of the Mississippi, is about 340,000 hectares. It is very good land. A treaty reserved it for our people in 1867 in return for relinquishing a much larger area of northern Minnesota. There are 47 lakes on the reservation. There's maple sugar, there are hardwoods and there are all the different medicine plants my people use: our reservation is called 'the medicine chest of the Ojibways'. We have wild rice, we have deer, we have beaver, we have fish – every food we need. On the eastern part of the reservation there are stands of white pine. On the part furthest west there used to be buffalo, but this area is now farmland, situated in the Red River valley.

I ask you to shake off your fear. There is a lot to be learned from our knowledge, but you need us in order to learn it

Our traditional forms of land use and ownership are similar to those of a community land trust. The land is owned collectively, and we have individual or, more often, family-based usufruct rights: each family has traditional areas in which it fishes and hunts. In our language the words *anishinabeg akiing* describe the concept of land ownership. They translate as 'the land of the people', which doesn't infer that we own our land but that we belong on it.

In 1887 the General Allotment Act was passed. The Federal Government divided our reservation into 30-hectare parcels of land and allotted each parcel to an individual, hoping that through this change we would somehow become yeoman farmers, adopt the notion of progress, and become civilized. Then, after each Indian had received an allotment, the rest of the land was declared 'surplus' and given to white people to homestead. On our reservation almost the entire land base was allotted, except for some pinelands that were annexed by the state of Minnesota and sold to timber companies.

Winona LaDuke: 'Can your society continue to live without ours?'

By 1920, 99 per cent of original White Earth Reservation lands was in non-Indian hands. By 1930 many of our people had died from tuberculosis and other diseases, and half of our remaining population lived off-reservation. Three generations of our people were forced into poverty and made refugees in this society.

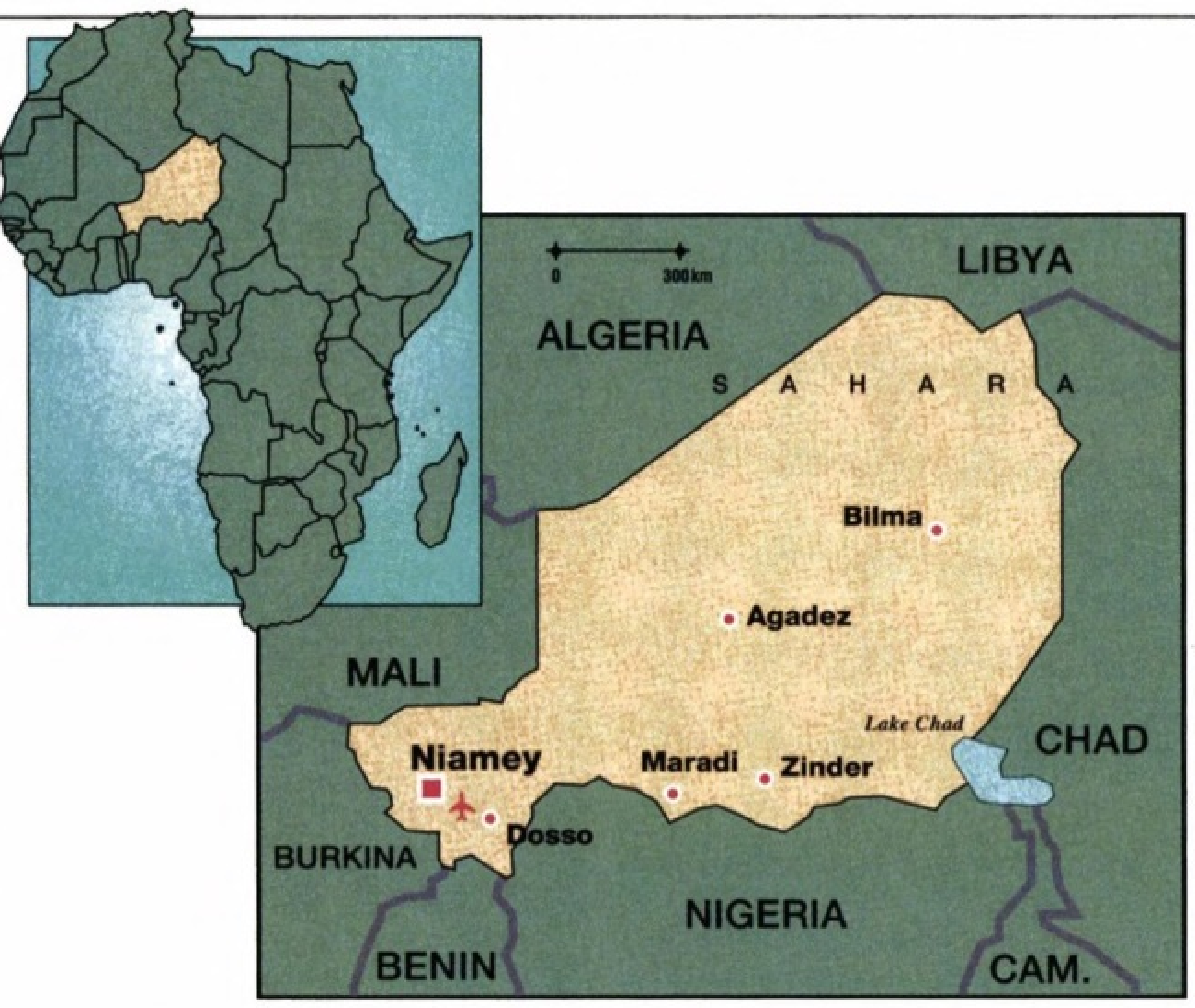
We have watched the destruction of our ecosystem and the theft of our resources. In not controlling our land we are unable to control what is happening to our ecosystem. So we are struggling to regain control through the White Earth Land Recovery Project. Our strategy is to strengthen our own traditional economy – thereby strengthening our traditional culture as well – so that we can produce 50 per cent or more of our own food. We are rich in terms of wild rice. The Creator, Gitchi Manitu, gave us wild rice, said we should eat it, said we should share it; we have traded it for thousands of years. A lot of our political struggle is, I am absolutely sure, due to the fact that Gitchi Manitu did not give wild rice to Uncle Ben to grow in California.

White people who live there are deathly afraid of our gaining control over half our land base, which is all we're trying to do. I'm sure they are afraid we will treat them as badly as they have treated us. I ask you to shake off your fear. There is a lot to be learned from our knowledge, but you need us in order to learn it. ■

Winona LaDuke is an environmentalist and Native American indigenous-rights activist. This is an edited version of a talk first delivered at the 13th Annual EF Schumacher Lectures in the US. In December 1996 Winona will teach at Schumacher College, UK. For details Tel: +44 (0)1803 865934, fax: +44 (0)1803 866899.

Country profile

Niger



NIGER'S Ténéré Desert could well be the world's most beautiful. Dreamy dunes of orange sand rise to over 200 metres in these southern swathes of the Sahara, often topped by distant glimpses of the majestic mountains of Aïr and Ténéré. Two-thirds of Niger is desert and most of its people make their way in the more fertile south watered by the great river which gives the country its name.

Yet the desert helps define Niger in more ways than one. In the mid-1970s the country was hit hard by the merciless drought which gripped the whole of the Sahel. In the mid-1990s Niger is most likely to be mentioned in international news for the ongoing rebellion of the nomadic Tuareg people who make up ten per cent of the population.

Dubbed the 'Kurds of Africa' for the way they span national boundaries, rendering them a minority wherever they live, the Tuareg have been fighting the central government since May 1985. A peace accord was signed last year but broke down within three months, though the Tuareg cause will have been greatly damaged by the death of its historic leader, Mano Dayak, in a plane explosion over the Ténéré Desert on 15 December 1995.

The other thing for which Niger might receive unwelcome international recognition is its current status as the country with the worst infant and child mortality in the world. Most countries have vastly improved their rates of child survival over the last three decades. Niger made improvements too but has sunk in the last few years to reach exactly the same appalling level of child deaths as it suffered at independence from France in 1960.

As this suggests, the needs of the poorest have hardly been met by the country's governments – neither that of the first President Diori Hamani nor those spawned by the succession of coups d'état which began with his toppling in 1974. The most recent of these coups was on 27 January this year, when Colonel Ibrahim Baré Mainassara took power at the head of a National Salvation Council (he was promoted to General in May). The coup at least put an end to the interminable dispute between the previous president and prime minister, who came from opposing political camps and had resisted all attempts at mediation despite the constitutional paralysis.

Like most other countries in Africa, Niger has been pursuing stringent economic adjustment policies, especially since the devaluation of the French African franc (CFA) at the insistence of France and the IMF in January 1994. These harsh economic measures have resulted in considerable hardship for ordinary people and provoked a series of strikes by the Federation of Trade Unions of Niger.

Niger is unquestionably one of the poorest countries in the world but its future does not have to be bleak. Its mineral potential is vast and large oil deposits have recently been discovered in the east.

It had an all-too-brief economic boom in the 1970s when the West invested in nuclear power and bought the uranium found under Niger's desert. 'We will sell our uranium to the devil if we have to,' said then-President Kountché, and Niger is still the world's second-largest producer of uranium after Canada. Any wealth that arises from these mineral resources should be invested in human-development initiatives that will allow many more of Niger's children to survive beyond their first year: the current levels of infant mortality are nothing short of an outrage. ■

Themon Djaksam

AT A GLANCE

CLAUDE SAUVAGEOT

Leader General Ibrahim Baré Mainassara

Economy $270 (Canada $19,970).

Monetary unit: CFA franc.

Main exports: uranium concentrates; live animals; vegetables; hides and skins; cotton. Around 65% of exports go to France. Uranium accounts for about 75% of export earnings.

Main imports: capital goods; oil and oil products; food; textiles; paper. Around 32% of imports come from France.

Mining and industry only involve 10 per cent of the official workforce.

People 8.9 million. Most people live in the more fertile part of the country.

Health Infant mortality 191 per 1,000 live births - by some distance the worst record in the world (Japan 4 per 1,000).

Culture The Hausa are the largest ethnic group, with 53% of the population. The Songhai account for 22% and the Fulani and the Tuareg for 10% each.

Religion: Mainly Muslim but there is a Christian minority as well as traditional beliefs.

Languages: French is the official language but Hausa, Jerma and Tamacheq (the language of the Tuareg) are also widely spoken.

Sources: *State of the World's Children 1996, UNICEF; The World: A Third World Guide 1995/96; Africa Review 1996; information supplied by the author.*

Previously profiled August 1986

NI star rating

EXCELLENT	★★★★★
GOOD	★★★★
FAIR	★★★
POOR	★★
APPALLING	★

STAR RATINGS

INCOME DISTRIBUTION ★★
The devaluation of the CFA franc in 1994 hit ordinary people hard.
1986 ★★

SELF-RELIANCE ★★
Likely to remain heavily dependent on aid for the foreseeable future.
1986 ★★★★

POSITION OF WOMEN ★
Very timid signs of improvement despite Islamic religious leaders' opposition to a more modern role.
1986 ★★

LITERACY ★
At just 12%, Niger has the lowest literacy rate in the world.
1986 ★

FREEDOM ★★
Slight signs of relaxation now that post-coup ban on political parties has been lifted.
1986 ★★★

LIFE EXPECTANCY ★
46 years, the world's seventh-lowest (France 77 years).
1986 ★

POLITICS

NI ASSESSMENT ★★
The way that General Baré Mainassara abolished the Independent National Electoral Commission and then conducted the presidential election of July 1996, declaring himself the outright winner in the first round, will hardly have encouraged optimism about democratic progress.

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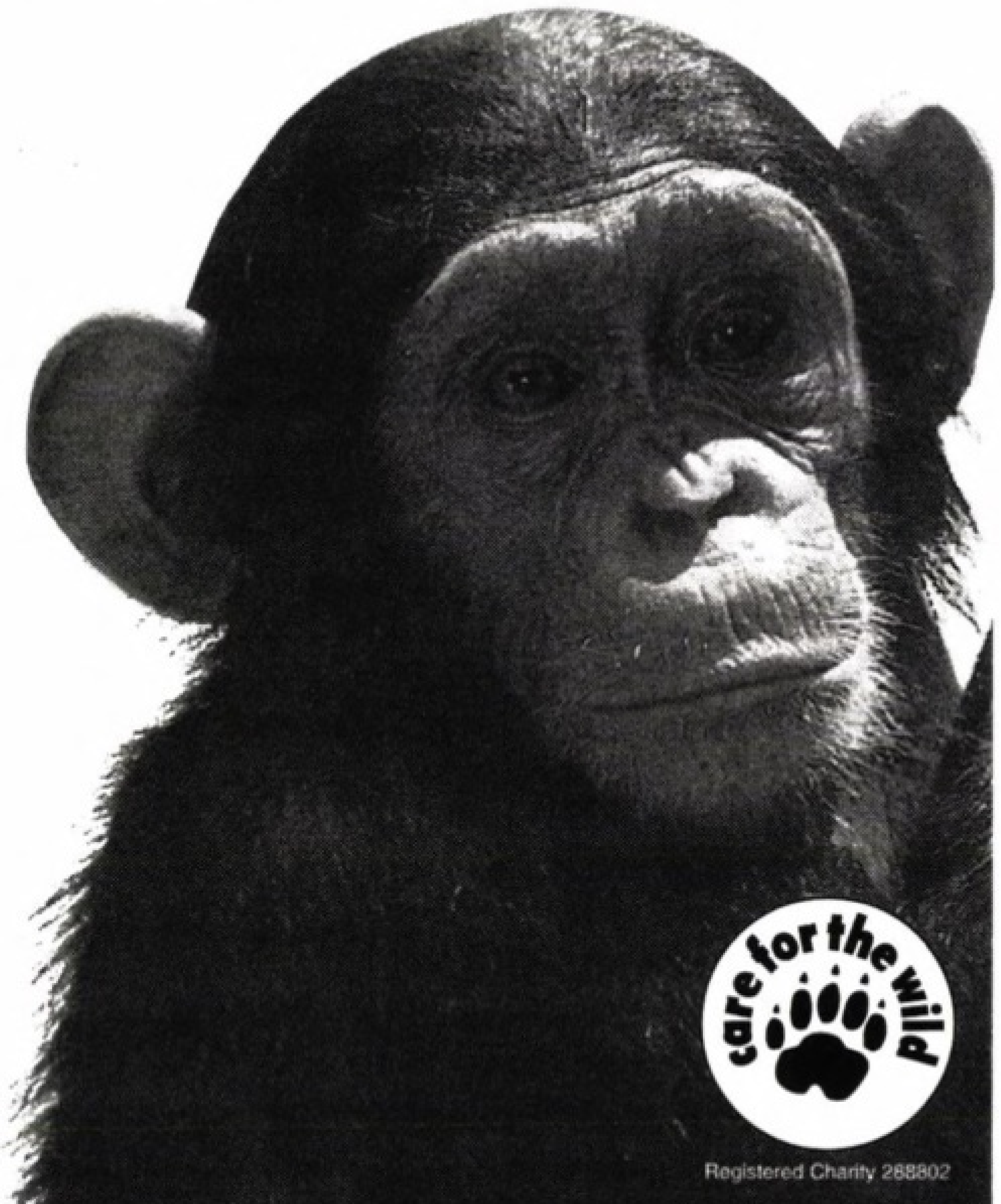

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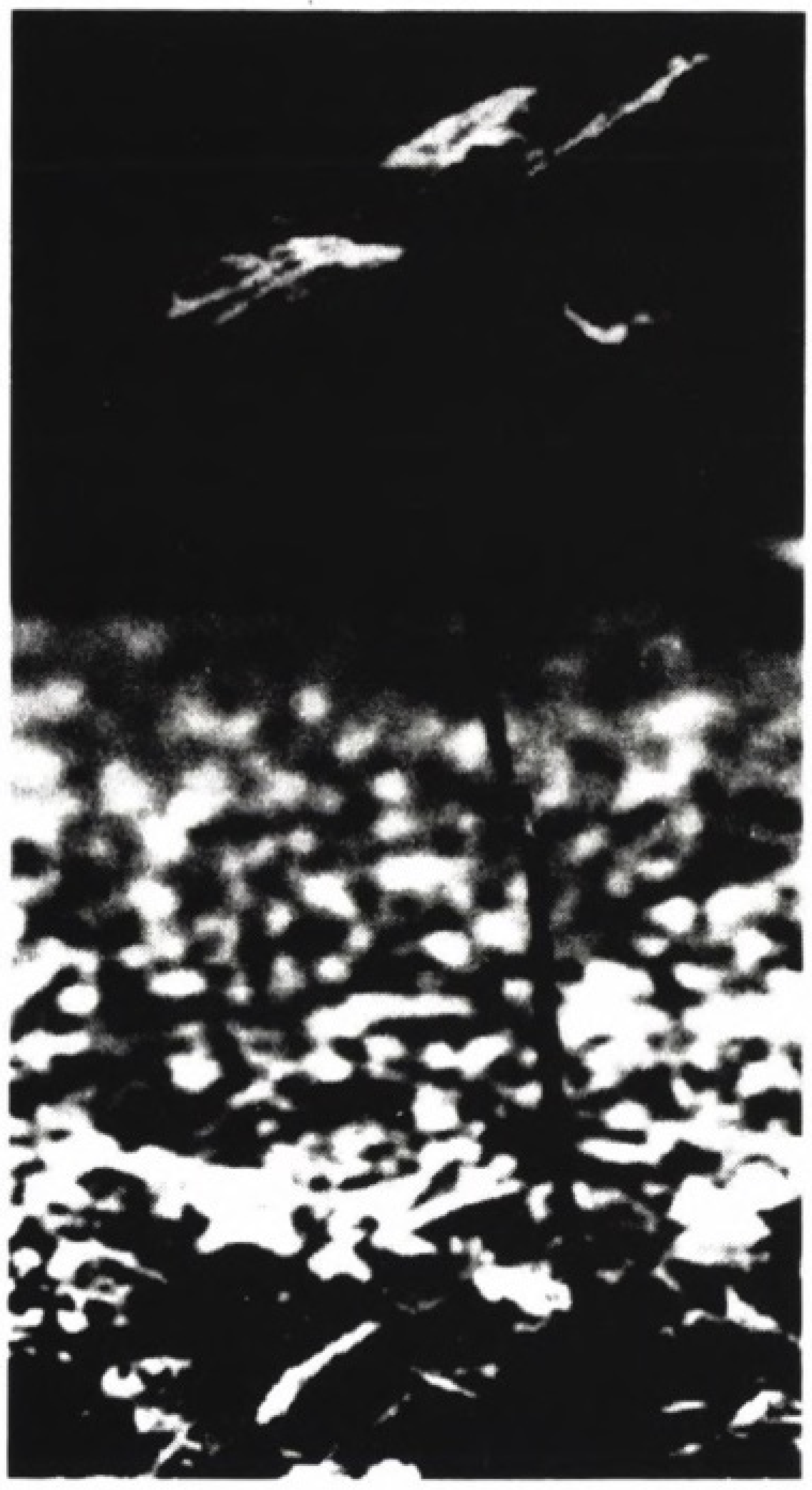

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